



ACCESS CONTROL SYSTEM GENERAL BUILDER

DEVICE/MODULE EXAMPLES

This document provides some sample devices utilized in an “Access Control Building System”.

Enable the “Display Bookmarks” feature of your PDF viewing application (varies with application used) to browse the different device categories or “Module Classes” to assist you in identifying which devices you would like to document with *g-VIEW*



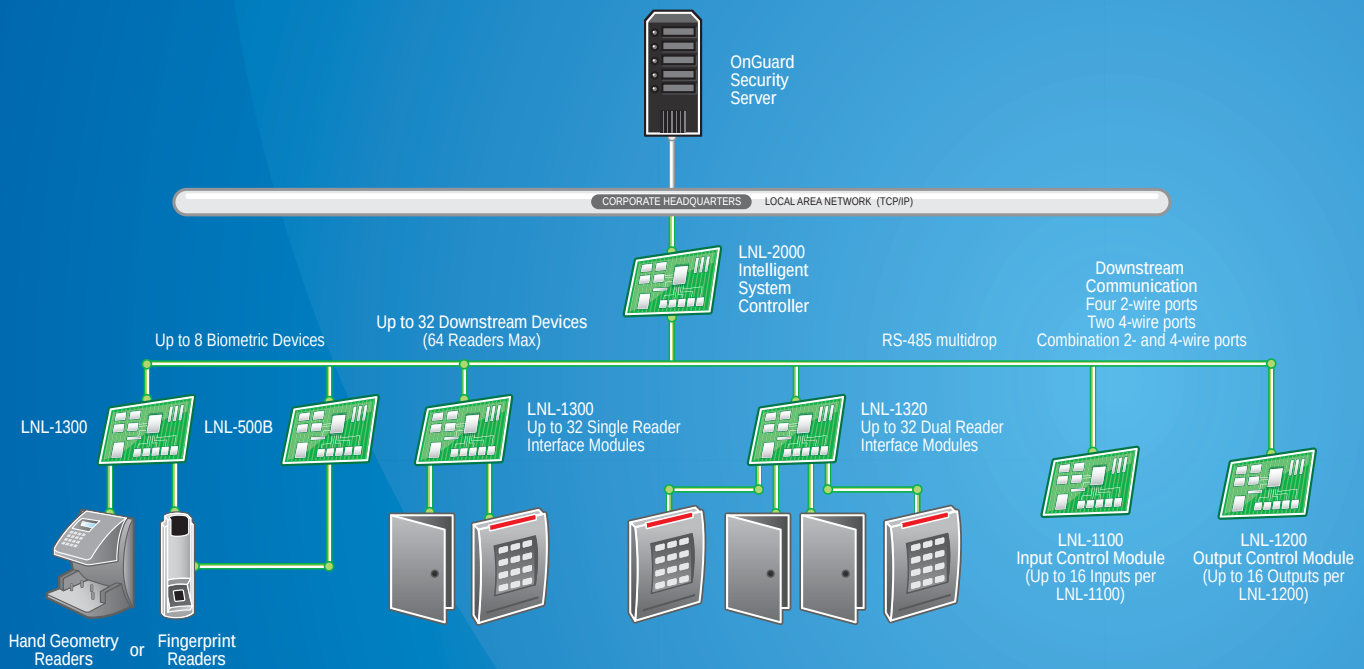
LNL-2000

The LNL-2000 Intelligent System Controller (ISC) from Lenel is designed for advanced access control applications. As the access control engine for the OnGuard system, the ISC provides power and functionality. The ISC can communicate to the host computer in a single- or dual-path configuration of Ethernet, dial-up or direct connect communication (RS-232/RS-485 combinations). Multiple combinations of Input Control Modules, Output Control Modules, Biometric Gateways, and Card Reader Interface Modules (up to 32 devices, 64 readers) can be configured.

The LNL-2000 can communicate upstream to the host computer at up to 115.2 Kbps via RS-232, RS-485 multidropped, dial-up, or Ethernet communication. The LNL-2000 can store up to 350,000 cardholders online, and supports selective download for larger cardholder databases. The ISC has two host communication ports. It also has four downstream communication ports, which support either four 2-wire or two 4-wire RS-485 communication. In either configuration, you may connect up to 32 devices in many combinations of LNL-1100, LNL-1200, LNL-1300, LNL-1320, LNL-500B, and LNL-500W modules.

Features and Functionality

- Host dual path communication enabled - direct wire (RS-232/RS-485 multi-dropped), Ethernet TCP/IP, or dial-up communications
- 1 MB on board memory expandable to 8 MB (up to 350,000 cardholders)
- 12 VAC or 12 VDC input power
- Supports up to 16 different formats (8 card formats and 8 asset formats)
- Biometric template storage support for RSI®, Identix®, and Bioscrypt®
- Enhanced anti-passback capabilities
- Flash memory for real-time program updates
- Lithium battery back-up for event memory
- Up to 32,000 access level permissions
- 255 holidays with grouping
- 255 timezones, each with 6 intervals
- Elevator control support for up to 128 floors
- Alarm masking
- Individual extended held open and strike times (ADA required)
- Up to 9-digit user PIN codes
- Status LEDs for heartbeat, upstream and downstream communication
- Two dedicated inputs for tamper and power failure status
- NIST Certified Advanced Encryption Standard (AES) 128-bit algorithm for communications



Controller Options

LNL-2000	Standard 1 MB on-board memory
Memory Options	
LNL-1003MK	3 MB memory expansion kit (Includes 3 MB memory and expansion board)
LNL-1007MK	7 MB memory expansion kit (Includes 7 MB memory and expansion board)
Host Communications	
LNL-ETHLAN	Micro serial server, flash ROM, DB25 serial port RJ-45 (10/100Base-T)
LNL-ETHLAN-MICR	CoBox Micro serial server, flash ROM, RJ-45 (10/100Base-T), diagnostic LEDs, dimensions 1.6 x 1.9 in. (40 x 49 mm), internally powered and includes standoffs
Dial-Up Modem	
LNL-56KEXT	56 K external Modem with cables
LNL-DC336K	12 VDC-powered/33.6 K external modem for Intelligent System Controller

Specifications

Primary Power (DC or AC)		* The ISC is for use in low voltage, power-limited, class 2 circuits only.
DC input:	12 VDC $\pm$ 15%. 400 mA	
AC input:	12 VAC $\pm$ 15%. 650 mA RMS	
Memory and Clock Backup		3 V lithium, type BR2325
Communication Ports		
Port 1, 6:	RS-232 or RS-485 (2-wire or 4-wire) 9600 to 115.2 Kbps async	
Ports 2-5:	RS-485 (2-wire or 4-wire) 9600 to 38.4K bps async	
Inputs		
Cabinet Tamper Monitor:	Unsupervised, dedicated	
Power Fault Monitor:	Unsupervised, dedicated	
Wire Requirements		
Power:	1 twisted pair, 18 AWG	
RS-485:	24 AWG twisted pair(s) with shield, 4000 ft. (1219 m) maximum	
RS-232:	24 AWG, 25 ft. (7.6 m) maximum	
Inputs:	Twisted pair, 30 ohms maximum	
Environmental		
Temperature:	Operating: 32° to 158° F (0° to +70° C) Storage: -67° to 185° F (-55° to +85° C)	
Humidity:	0 to 95% RHNC	
Mechanical		
Dimensions:	6 x 8 x 1 in. (152 x 203 x 25 mm)	
Weight:	10 oz. (290 g) nominal	
Approvals		
	UL 294 and 1076-listed, CE-marked, RoHS compliant	
	NIST certified Advanced Encryption Standard (AES) 128-bit communication algorithm	



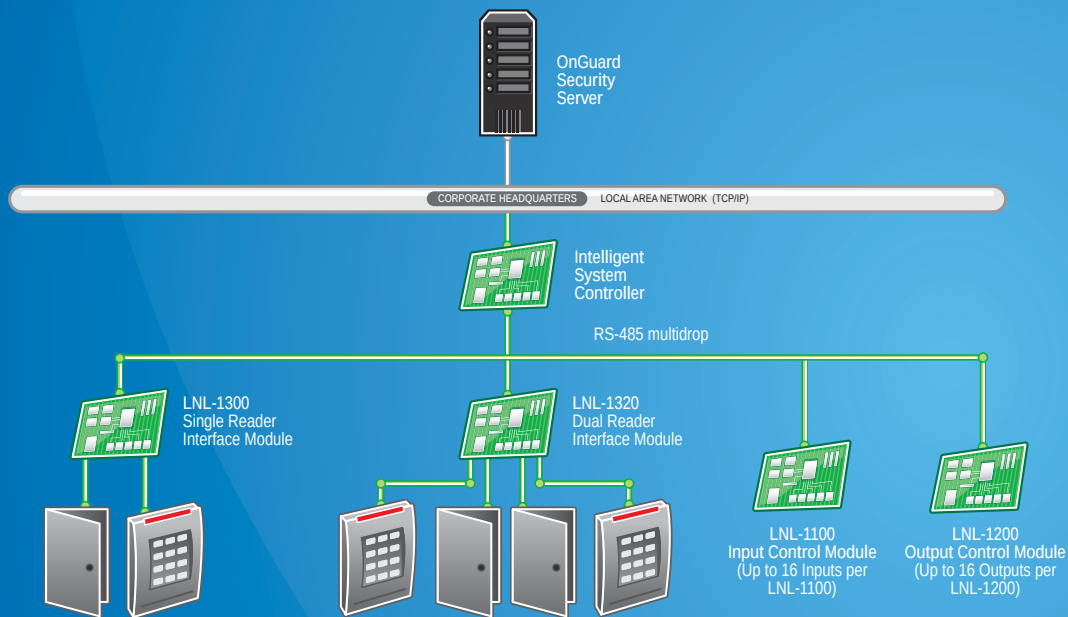
LNL-1320 Series 2

Lenel Systems International offers a Dual Reader Interface (DRI) module for access control solutions. Most access control card readers, keypads, or readers with keypads that use standard Wiegand Data1/Data0 or Clock/Data communication are supported, as are those that support the bidirectional RS-485 Open Supervised Device Protocol (OSDP). Lock, unlock, and facility code offline access modes are supported on all readers connected to the DRI. Each DRI supports up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.

The DRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 DRI modules can be multidropped using RS-485 2-wire or 4-wire communication up to 4,000 feet per port away from the ISC. Each DRI module is individually addressed for increased reporting capabilities with OnGuard access control software applications. The DRI includes eight inputs that support normally open, normally closed, supervised, and non-supervised circuits. In addition, six output relays support fail-safe or fail-secure operation.

Features and Functionality

- 12 or 24 VDC power supply
- Supports Data1/Data0, Clock/Data and Lenel OSDP-compatible RS-485 readers and keypads
- Downloadable firmware
- Six Form-C 5 A at 30 VDC relay outputs
- Up to 16 different formats (8 card formats and 8 asset formats)
- Issue code support for magnetic and Wiegand formats
- Door contact supervision (open/closed)
- REX push-button monitor
- Strike control output
- Bicolor reader status LED support and 2-wire LED support
- Beeper control
- Dedicated tamper and power failure circuits
- Support for offline reader access mode
- On-board jumpers for termination
- On-board regulator allows 12 VDC reader support from 24 VDC power source
- DIP switch-selectable addressing



Power Supplies & Enclosures

LNL-AL400ULX	Lenel UL-listed 4 A, 110 VAC power supply - 12 or 24 VDC 4 A output (switch-selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in. / 305 x 406 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
LNL-AL600ULX-4CB6	Lenel UL Listed Power Supply - 12 or 24 VDC 6 A output (switch-selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in. / 457 x 610 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
ABT-12	Battery kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

Primary Power (DC)	* The DRI is for use in low voltage, power-limited, class 2 circuits only.
DC input:	12 or 24 VDC $\pm$ 15%, 450 mA
Reader Power	
DC output:	12 VDC, 125 mA regulated or 12 to 24 VDC 125 mA current limited
Reader Port Compatibility	Wiegand Data1/Data0 Magnetic Clock/Data F/2F single-wire protocol Open Supervised Device Protocol (RS-485)
Environmental	
Temperature:	Operating: 0° to +70° C (32° to 158° F) Storage: -55° to +85° C (-67° to 185° F)
Humidity:	0 to 95% RHNC
Mechanical	
Dimension:	6 x 8 x 1 in. (152 x 203 x 25 mm)
Weight:	10 oz. (290 g) nominal
Approvals	UL 294 and 1076-listed, CE-marked, ROHS compliant



LNL-1100 Series 2

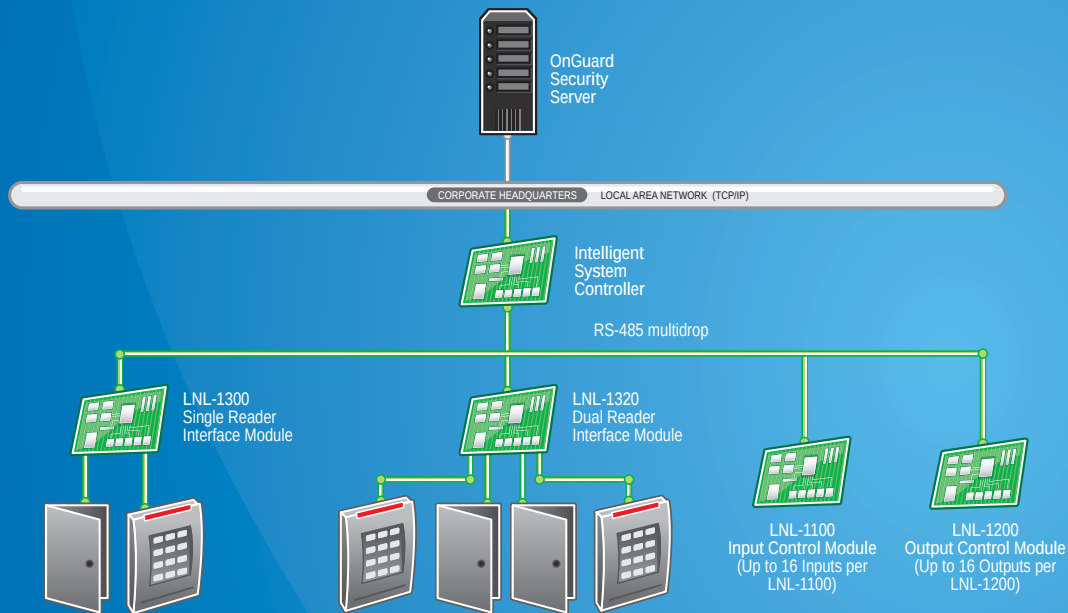
The Lenel Input Control Module (ICM) provides the access control system with high-speed acknowledgment of critical alarm points in monitored areas. The ICM communicates directly with the Intelligent System Controller (ISC) either by 2-wire or 4-wire RS-485 communication. The ICM has 16 configurable input control points and 2 output control relays. It supports normally open, normally closed, supervised and non-supervised circuits.

The input circuits are scanned using an analog-to-digital converter. The digitized input status signal is software-monitored and controlled, so that each input point can be programmed as a supervised or non-supervised alarm point.

The output relays can also be configured for fail-safe or fail-secure operation. Each relay supports the "On," "Off," and "Pulse" Lenel OnGuard software commands.

Features and Functionality

- Grade B, A, and AA line supervision
- 12 or 24 VDC input power
- 16 programmable supervised or non-supervised contacts
- 2 Form-C 5 A, 30 VDC contacts for load switching
- 2 dedicated inputs for tamper and power failure status
- On-board termination jumpers
- DIP switch-selectable addressing
- Elevator control, support for 64 floors
- Status LED for host communication and heartbeat
- Variable resistor values for line supervision
- Downloadable firmware



Power Supplies & Enclosures

LNL-AL400ULX	Lenel UL-listed 4 A, 110 VAC power supply - 12 or 24 VDC 4 A output (switch-selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in. / 305 x 406 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
LNL-AL600ULX-4CB6	Lenel UL-listed power supply - 12 or 24 VDC 6 A output (switch-selectable), 120 VAC (1.6 A) input, continuous supply current with enclosure (18 x 24 x 4.5 in. / 457 x 610 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
ABT-12	Battery Kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

Primary Power (DC)	* The ICM is for use in low voltage, power-limited, class 2 circuits only.
DC input:	12 or 24 VDC $\pm$ 15%. 350 mA
Memory and Clock Backup	3 V lithium, type BR2325
Environmental	
Temperature:	Operating: 0° to +70° C (32° to 158° F) Storage: -55° to +85° C (-67° to 185° F)
Humidity:	0 to 95% RHNC
Mechanical	
Dimension:	6 x 8 x 1 in. (152 x 203 x 25 mm)
Weight:	10 oz. (290 g) nominal
Approvals	UL 294 and 1076-listed, CE-marked, ROHS compliant



LNL-1200 Series 2

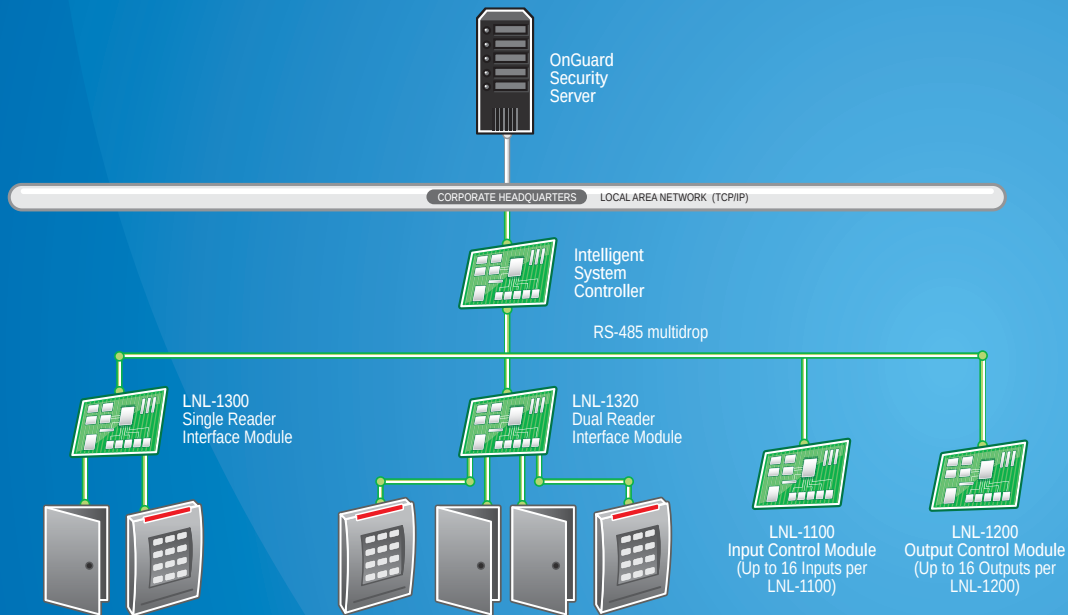
The Lenel Output Control Module (OCM) communicates directly with the Intelligent System Controller (ISC) by either 2-wire or 4-wire RS-485 communication. Each OCM is an individually-addressed device, and counts as a single device on all Intelligent System Controllers.

The OCM can be operated by either 12 or 24 VDC power. Each OCM includes dedicated tamper and power failure input contacts.

The OCM has 16 programmable output relays that can be configured for fail-safe or fail-secure operation. Each relay supports the "On," "Off," and "Pulse" Lenel OnGuard software commands.

Features and Functionality

- 16 Form-C 5 A, 30 VDC contacts for load switching
- 12 or 24 VDC input power
- 2 dedicated digital inputs for tamper and power failure status
- RS-485 communication, multidropped (2-wire or 4-wire RS-485)
- Up to 16 OCMs per Intelligent System Controller
- On-board termination jumpers
- DIP switch-selectable addressing
- Status LEDs for communication to the host, heartbeat and relay status
- Elevator control, support for 64 floors



Power Supplies & Enclosures

LNL-AL400ULX	Lenel UL-listed 4 A, 110 VAC power supply - 12 or 24 VDC 4 A output (switch-selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in. / 305 x 406 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
LNL-AL600ULX-4CB6	Lenel UL-listed power supply - 12 VDC or 24 VDC 6 A output (switch-selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in. / 457 x 610 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
ABT-12	Battery kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

Primary Power (DC)	* The OCM is for use in low voltage, power-limited, class 2 circuits only.
DC input:	12 or 24 VDC $\pm$ 15%. 500 mA
Environmental	
Temperature:	Operating: 32° to 158° F (0° to +70° C) Storage: -67° to 185° F (-55° to +85° C)
Humidity:	0 to 95% RHNC
Mechanical	
Dimension:	6 x 8 x 1 in. (152 x 203 x 25 mm)
Weight:	16 oz. (454 g) nominal
Approvals	UL 294 and 1076-listed, CE-marked, ROHS compliant



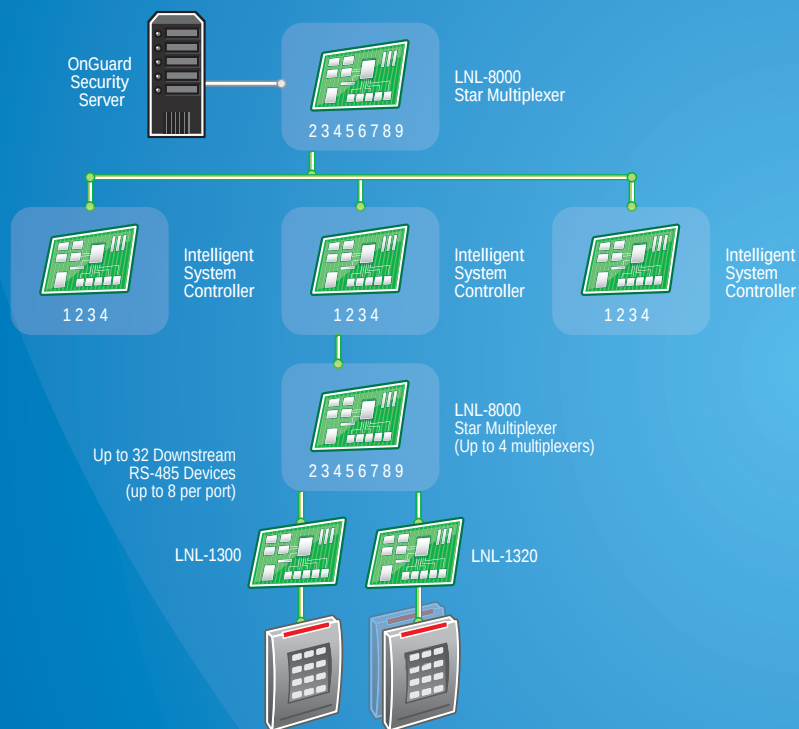
LNL-8000

The Star Multiplexer from Lenel is designed to implement star topology on a downstream port of any Lenel Intelligent System Controller or on any host communication port of any OnGuard server. Up to eight RS-485 (2-wire) connections or four RS-485 (4-wire) connections can be made downstream of the LNL-8000. The Lenel Star Multiplexer requires 12 VDC for power. It allows communication protocol conversion, and provides connection with alternate communication devices to extend effective distances.

The master or host interface can use either RS-232 or RS-485 (2-wire) communication. The Lenel Star Multiplexer interfaces upstream with the Lenel ISC, and downstream with one of many Lenel RS-485 products (including the LNL-1100 Input Control Module, LNL-1200 Output Control Module, LNL-1300 Single Reader Interface Module, LNL-1320 Dual Reader Interface Module and LNL-500A, LNL-500B, or LNL-500W Gateway Interface Modules) on each downstream port (ports 2-9). A maximum of eight (8) devices are allowed per downstream port.

Features and Functionality

- Host communications - 38.4 Kbps direct wire (RS-232/RS-485 multidropped)
- 12 VDC input power
- Status LEDs for heartbeat, upstream and downstream communication
- Support for either 2-wire or 4-wire RS-485 topologies
- RS-485 on-board termination is jumper selectable
- Can be used for retrofit and new wiring configurations



Access Control

Mechanical and Architectural Characteristics and Wiring

Requirements	The acceptable power supply is 12 VDC. Locate the power source as close as possible to the LNL-8000.
Communications	Use a minimum of 18 AWG (one twisted pair) wiring for the power supply. Communication with the Intelligent System Controller is via a 2-wire or 4-wire RS-485 interface. The interface allows multidrop communication on a single ISC port, up to 4,000 feet (1219 m) away per port. It also can be used to convert a single RS-232 communication port to a multidrop RS-485 port. Use twisted pair(s) with a minimum of 24 AWG and a shield for communication. The 2-wire or 4-wire communications with end-of-line termination are jumper-selectable.

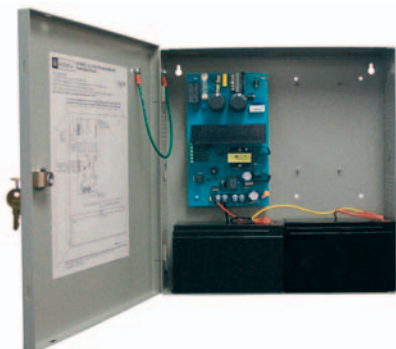
Power Supplies & Enclosures

LNL-AL400ULX	Lenel UL-listed 4 A, 110 VAC power supply - 12 VDC or 24 VDC 4 A output (switch-selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in. / 305 x 406 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
LNL-AL600ULX-4CB6	Lenel UL-listed power supply - 12 VDC or 24 VDC 6 A output (switch-selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in. / 457 x 610 x 114 mm), lock and open frame transformer, tamper switch, UPS-capable (battery optional), UL-listed
ABT-12	Battery kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

Primary Power (DC or AC)	* This module is for use in low voltage, power limited, class 2 circuits only.
DC input:	12 VDC ± 15%, 250 mA
Environmental	
Temperature:	Operating: 32° to 158° F (0° to +70° C) Storage: -67° to 185° F (-55° to +85° C)
Humidity:	0 to 95% RHNC
Mechanical	
Dimensions:	6 x 5 x 1 in. (152 x 127 x 25 mm)
Weight:	4 oz. (180 g) nominal
Approvals	UL 294 and 1076-listed, CE-marked

Overview



- These multi-agency approved single output power supply/chargers convert a 115VAC/60Hz input into one (1) Class 2 Rated 12VDC or 24VDC power limited output.

AL400ULX

- Grey enclosure.

AL400ULXR

- Red enclosure.

Specifications

- | | |
|---|--|
| <ul style="list-style-type: none"> • 12VDC or 24VDC selectable output. • 12VDC @ 4 amp or 24VDC @ 3 amp supply current. • Class 2 Rated power limited output. • Input 115VAC / 60Hz, 1.45 amp. • Input fuse rated @ 3.5 amp/250V. • Filtered and electronically regulated output. • Short circuit and thermal overload protection. • Built-in charger for sealed lead acid or gel type batteries. • Maximum charge current .7 amp. • Automatic switch over to stand-by battery when AC fails (zero voltage drop). • AC fail supervision (form "C" contacts). | <ul style="list-style-type: none"> • Low battery supervision (form "C" contacts). • Battery presence supervision (form "C" contacts). • AC input and DC output LED indicators. • Enclosure: <ul style="list-style-type: none"> - Combination knockouts are 1/2" and 3/4" - Accommodates up to two (2) 12VDC/7AH batteries. • Product weight: <ul style="list-style-type: none"> - AL400ULX: 7.3 lbs. - AL400ULXR: 6.3 lbs. • Shipping weight: <ul style="list-style-type: none"> - AL400ULX: 8.2 lbs. - AL400ULXR: 7.3 lbs. |
|---|--|

Agency Approvals



- | | |
|---------|---|
| UL 294 | UL Listed for Access Control System Units. |
| UL 603 | UL Listed Standard for Power Supplies for Use with Burglar-Alarm Systems. |
| UL 1069 | UL Listed Hospital Signaling and Nurse Call Equipment. |
| UL 1481 | UL Listed Standard for Safety for Fire Protective Signaling Systems. |



- CUL Listed - CSA Standard C22.2 No.205-M1983, Signal Equipment.



- MEA - NYC Department of Buildings Approved.



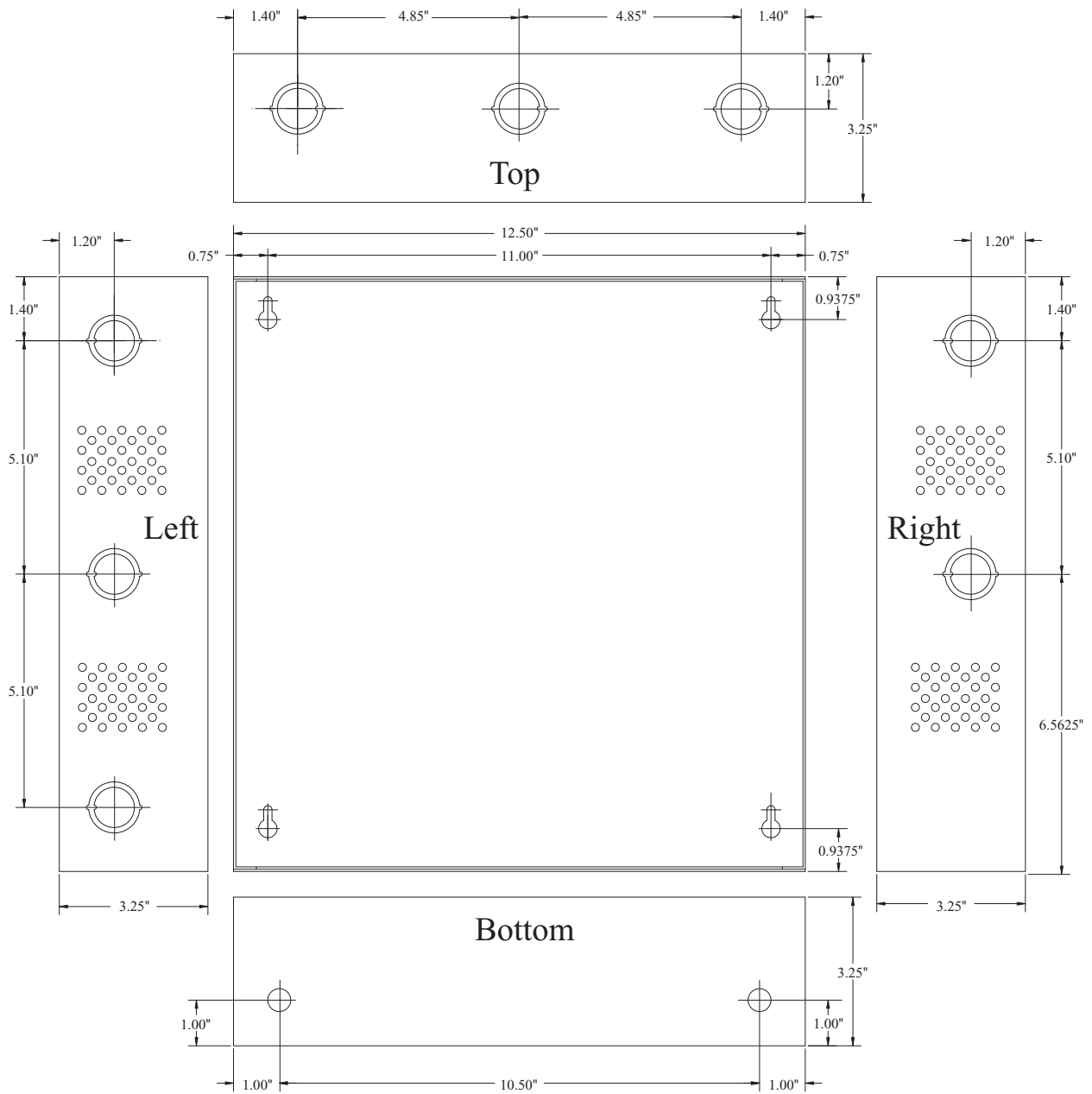
- CSFM - California State Fire Marshal Approved.



- FM - Factory Mutual Approved.

Enclosure Dimensions

13.5"H x 13"W x 3.25"D





Overview

- These multi-agency approved single output power supply/chargers convert a 115VAC/60Hz input into one (1) 12VDC or 24VDC non-power limited output.

AL600ULX

- Grey enclosure.

AL600ULXR

- Red enclosure.

Specifications

- | | |
|--|--|
| <ul style="list-style-type: none"> • 12VDC or 24VDC selectable output. • 6 amp supply current. • Input 115VAC / 60Hz, 1.9 amp. • Input fuse rated @ 3.5 amp/250V. • Filtered and electronically regulated output. • Short circuit and thermal overload protection. • Built-in charger for sealed lead acid or gel type batteries. • Maximum charge current .7 amp. • Automatic switch over to stand-by battery when AC fails (zero voltage drop). • AC fail supervision (form “C” contacts). | <ul style="list-style-type: none"> • Low battery supervision (form “C” contacts). • Battery presence supervision (form “C” contacts). • AC input and DC output LED indicators. • Enclosure: <ul style="list-style-type: none"> - Combination knockouts are 1/2" and 3/4" - Accommodates up to two (2) 12VDC/7AH batteries. • Product weight: <ul style="list-style-type: none"> - AL600ULX: 7.6 lbs. - AL600ULXR: 6.6 lbs. • Shipping weight: <ul style="list-style-type: none"> - AL600ULX: 8.5 lbs. - AL600ULXR: 7.6 lbs. |
|--|--|

Agency Approvals



- | | |
|---------|---|
| UL 294 | UL Listed for Access Control System Units. |
| UL 603 | UL Listed Standard for Power Supplies for Use with Burglar-Alarm Systems. |
| UL 1069 | UL Listed Hospital Signaling and Nurse Call Equipment. |
| UL 1481 | UL Listed Standard for Safety for Fire Protective Signaling Systems. |



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| CUL Listed - CSA Standard C22.2 No.205-M1983, Signal Equipment. |
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| MEA - NYC Department of Buildings Approved. |
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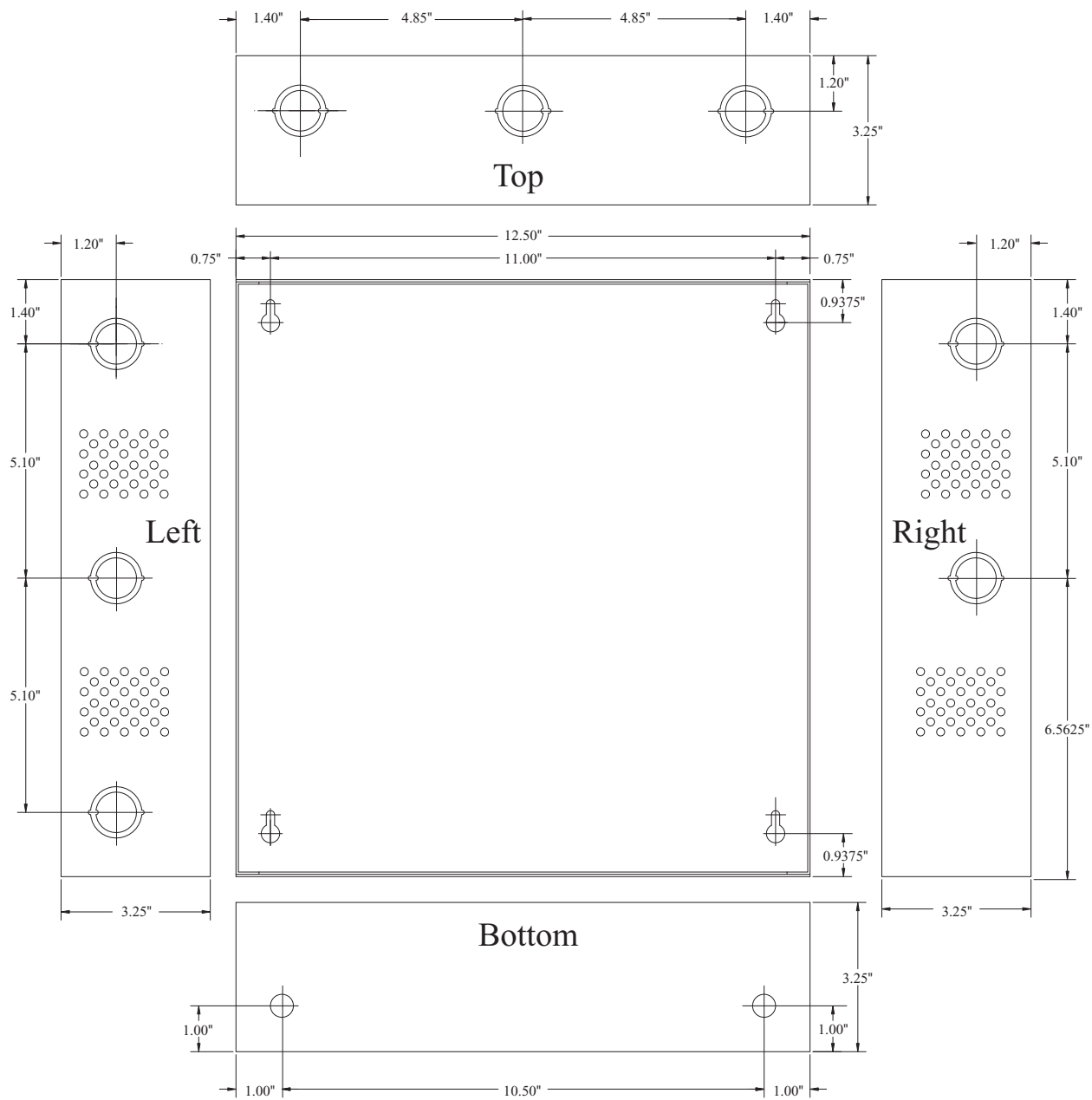


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| CSFM - California State Fire Marshal Approved. |
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|-------------------------------|
| FM - Factory Mutual Approved. |
|-------------------------------|

Enclosure Dimensions
13.5"H x 13"W x 3.25"D





Overview

- These power distribution modules convert a single AC or DC input into eight (8) individual outputs.



PD8

- Converts a single AC or DC input into eight (8) individual fuse protected outputs rated @ 3.5 amp each, (fuses are rated @ 3.5 amp up to 5 amp fuses may be used).

PD8CB

- Converts a single AC or DC input into eight (8) individual PTC protected outputs rated @ 2.5 amp each.

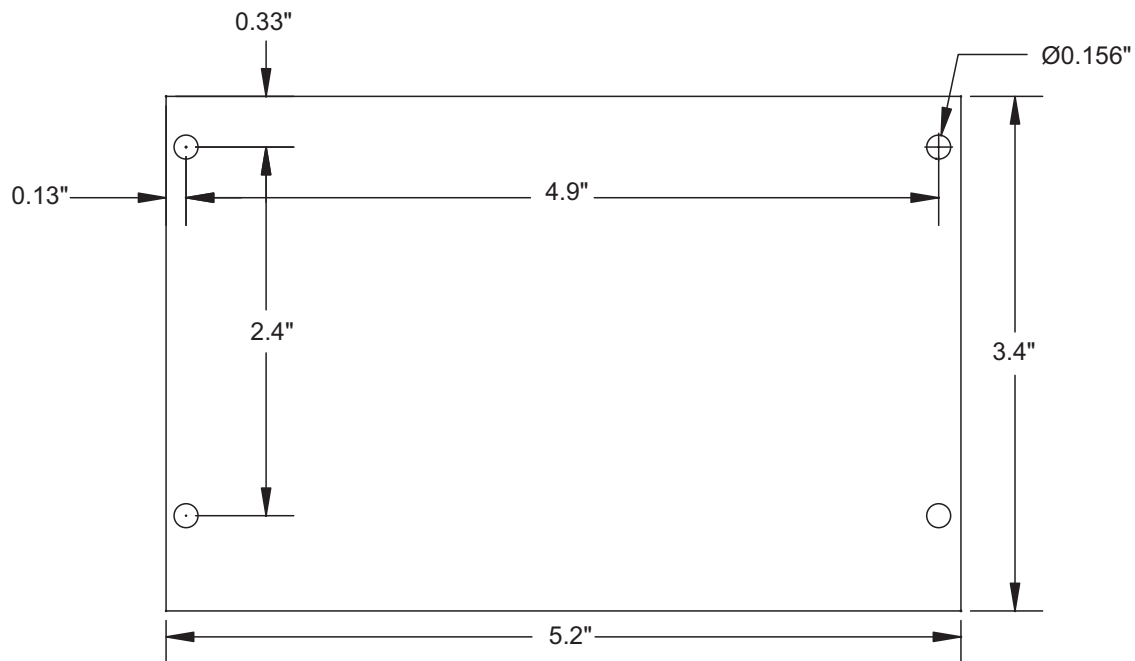
Specifications

- 28VAC or 28VDC up to 10 amp.
- Eight (8) individual outputs.
- Surge suppression.
- Power output LED indicator.
- Power ON/OFF switch.

Board Dimensions (approximate)

5.25"H x 3.25"W x 1"D

Mounting Diagram





Tripp Lite
1111 West 35th Street
Chicago, IL 60609 USA
Telephone: +(773) 869 1234
E-mail: saleshelp@tripplite.com

Model #: SU2200RTXL2UA

SmartOnline Expandable 2U Rack / Tower UPS System - On-line, double-conversion, sine wave UPS with PDU switching, current monitoring and fault tolerant auto-bypass

Highlights



- 2200VA / 2.2kVA on-line, double-conversion, extended-run 2U rack / tower UPS
- Zero transfer time, on-line, double-conversion and economy-mode operation supported
- Maintains sine-wave 110/120V +/-2% output during overvoltages to 138 and brownouts as low as 65V (50/60Hz auto-sensing)
- Simultaneous communications via HID compliant USB port, serial port, SNMP/Web card slot and EPO interface
- Fault tolerant auto-bypass mode, current monitoring and switched PDU control via 2 switchable output load banks
- Input: NEMA 5-20P (120V) / Output: 6 NEMA 5-15/20R and 1 NEMA L5-20R (120V)
- 2 year product warranty / \$250,000 [Ultimate Lifetime Insurance](#) (USA & Canada only)

Description

2200VA on-line, double-conversion UPS system for critical server, network and telecommunications equipment. 2U rackmount form factor with an installed depth of only 19 in. Expandable battery runtime with optional BP48V24-2U and BP48V60RT-3U external battery packs. Full-time sine wave 110 or 120V +/-2% output. Online, double-conversion Uninterruptible Power Supply (UPS) actively converts raw incoming AC power to DC, then re-converts output back to completely regulated, filtered AC output. Operates continuously without using battery power during brownouts to 65V and overvoltages to 138V. NEMA 5-20P input plug; NEMA 5-15/20R and NEMA L5-20R output receptacles. Network-grade AC surge and noise suppression. Zero transfer time between AC and battery operation. Highly efficient operation in optional economy mode setting, saving BTU heat output and energy costs. Network management interfaces support simultaneous communications via USB port, DB9 serial port and SNMPWEBCARD slot. HID-compliant USB interface enables integration with built-in power management and auto shutdown features of Windows and Mac OS X. Supports simultaneous detailed monitoring of equipment load levels, self-test data and utility power conditions via all 3 network interfaces. Includes PowerAlert monitoring software and complete cabling. Emergency Power Off (EPO) interface. Integrated 2-bank PDU switching supports load shedding and remote-reboot of connected equipment. 3-stage metered current monitoring and battery charge status LEDs. LED display panel easily rotates for better viewing in rackmount or tower configurations. Dataline surge suppression for dialup, DSL or network Ethernet connection. Utility power and voltage regulation LEDs. Audible alarm. Self-test. Fault-tolerant auto-bypass mode. 4-post rackmount accessories included; 2-9USTAND tower kit and 2POSTRMKITWM two post rack & wallmount accessories available. Field-replaceable, hot-swappable internal batteries and external battery packs. Attractive all-black color scheme. 2-year warranty and \$250,000 [connected equipment insurance](#); extended warranty and service contracts available

Package Includes

- SU2200RTXL2Ua On-line Double-Conversion UPS System
- PowerAlert Software and cabling
- Mounting hardware for 4 post rack enclosures
- Instruction manual with warranty information

Features

- SmartOnline high performance UPS system is ideal for critical voice, data, medical and industrial network applications
- True on-line, double-conversion UPS provides perfectly regulated sine wave output within 2% of 110/120V (user selectable) under all usage conditions
- Maintains continuous operation through blackouts, voltage fluctuations and surges with zero transfer time
- Removes harmonic distortion, fast electrical impulses, frequency variations and other hard to solve power problems not addressed by other UPS types
- Corrects line voltage conditions as low as 65V and as high as 138V back to selectable 110/120V (+/-2%) values
- Standard internal battery set offers 14 minutes runtime at half load (800W) and 4.5 minutes at full load (1600W)
- Extended Runtime with BP48V24-2U (limit 1) or BP48V60RT3U (multi-pack compatible) external battery packs
- Compact rackmount form factor installs using only 2 rack spaces (2U) with a maximum installed depth of only 19 inches
- Ships with all mounting accessories for 4 post rackmount installation
- Optional 2POSTRMKITWM enables 2 post rackmount or wallmount installation
- Optional 2-9USTAND accessory enables small-footprint upright tower placement
- Fault tolerant auto-bypass maintains continuous utility output to connected equipment, even in cases where the UPS suffers internal failure and requires maintenance
- Network interfaces support simultaneous communications via built-in USB, DB9 serial and SNMPWEBCARD slot
- HID compliant USB interface enables integration with built-in power management and auto shutdown features of Windows and Mac OS X
- Included PowerAlert UPS monitoring software supports safe unattended shutdown, monitoring and control via local connected servers, plus any number of additional servers over IP
- UPS interface supports on-battery, low-battery, power-restored, AC-voltage, DC-voltage, output current monitoring, battery charge current, battery capacity, AC line frequency, timed inverter sutoff, activate self-test, load bank output power control and remote reboot, UPS nominal voltage adjustment and UPS line to battery power voltage setpoints
- Built-in Emergency Power Off (EPO) interface with cable
- NEMA 5-20P input plug (user-installable NEMA 5-15P replacement plug included)/NEMA 5-15/20R & NEMA L5-20R output receptacles
- Integrated 2 bank switched PDU enables remote outlet management for load shedding or remote reboot of individual load banks (each bank has 3 outlets)
- Front panel LEDs offer current monitoring and battery charge level information
- UPS ships fully assembled in full compliance with DOT regulations, no time consuming connection of internal batteries by user required
- Single line TEL/DSL or network ethernet line surge suppression
- 2 year manufacturer's product warranty, \$250,000 [Ultimate Lifetime Insurance](#)

Specifications

OUTPUT	
Output Volt Amp Capacity (VA)	2200
Output kVA capacity (kVA)	2.2
Output Watt Capacity (watts)	1600
Output kW capacity	1.6
Output power factor	0.7
Crest Factor	3:1
Nominal Output Voltage(s) Supported	110v; 120v
Nominal Voltage details	120V default
Frequency compatibility	50 / 60 Hz
Frequency compatibility details	Output frequency matches input nominal on startup, defaults to 60 Hz on cold-start
Output voltage regulation (line mode)	+/- 2%

Output voltage regulation (Economy line mode)	+/- 10%
Output voltage regulation (Battery mode)	+/- 2%
Built-in UPS output receptacles	6 5-15/20R outlet(s); 1 L5-20R outlet(s)
Built-in controllable switched load banks	Two switchable three-outlet 5-15/20R load banks
Basic PDU options	PDUNV (1U / 2 C19, 12 C13 outlets); PDU1420T (0U / 14 5-15/20R outlets); PDU40TDUAL (0U / 40 5-15/20R outlets)
Metered PDU options	PDUMH20 (1U / 13 5-15/20R outlets); PDUMH20AT (1U / 16 5-15/20R outlets)*; PDUMV20 (0U / 16 5-15/20R outlets); PDUMV40 (0U / 32 5-15/20R outlets)
Switched PDU options	PDUMH20ATNET (1U / 16 5-15/20R outlets)*; PDUMV20NET (0U / 24 5-15/20R outlets)
External PDU redundancy options	*ATS switch options PDUMH20AT & PDUMH20ATNET support dual UPS and hot-swappable UPS configurations
Output AC waveform (AC mode)	Sine wave
Output AC waveform (battery mode)	Sine wave
INPUT	
Rated input current (at maximum load)	16A
Nominal input voltage(s) supported	110V AC; 120V AC
UPS input connection type	5-20P
UPS input connection description	Includes user-installable 5-15P replacement plug
Input circuit breaker	30A
UPS Input cord length (ft.)	10
UPS Input cord length (m)	3
Recommended Electrical Service	20A 120V
BATTERY	
Full load runtime (minutes)	4.5 min. (1600w)
Half load runtime (minutes)	14 min. (800w)
Expandable battery runtime	Extended runtime supported via optional external battery packs
External battery pack compatibility	BP48V24-2U (limit 1); BP48V60RT3U (multi-pack compatible)
DC system voltage	48V DC
Battery recharge rate (included batteries)	Less than 6 hours from 10% to 80%
Replacement battery cartridge (internal UPS battery replacement)	RBC94-2U
Battery Access	Front panel battery access door

Battery replacement description	Hot-swappable, user replaceable batteries
VOLTAGE REGULATION	
Voltage regulation description	Online, double-conversion power conditioning
Overvoltage correction	2% output voltage regulation during overvoltages to 138
Undervoltage correction	2% output voltage regulation during undervoltages to 80
Severe undervoltage correction	2% output voltage regulation during undervoltages to 65 (under 70% load only)
LEDS ALARMS & SWITCHES	
LED Indicators	14 LEDs indicate line power, online mode, economy/bypass mode, on-battery, overload, battery low, replace battery and fault status information; 4-LED meter displays load and battery charge levels; LED panel rotates for viewing in rack/tower formats
Alarms	Audible alarm indicates UPS startup, power-failure, low-battery, overload, UPS fault and remote shutdown conditions
Alarm cancel operation	Power-fail alarm can be silenced using alarm-cancel switch
Switches	2 Switches control off/on power status and alarm-cancel/self-test operation
SURGE / NOISE SUPPRESSION	
UPS AC suppression joule rating	570
UPS AC suppression response time	Instantaneous
UPS Dataline suppression	1 line TEL / DSL or 10Base T Ethernet protection
EMI / RFI AC noise suppression	Yes
PHYSICAL	
Installation form factors supported with included accessories	4 post 19 inch rackmount (mounting rail kit included); 2 post rackmount (use 2POSTRMKITWM); Wallmount (use 2POSTRMKITWM); Tower (use 2-9USTAND)
Installation form factors supported with optional accessories	2 post rackmount (use 2POSTRMKITWM); Wallmount (use 2POSTRMKITWM); Tower (use 2-9USTAND)
Primary form factor	Rackmount
UPS / Power Module dimensions in primary form factor (height x width x depth / inches)	3.50 x 17.50 x 19.00
UPS / Power Module dimensions in primary form factor (height x width x depth / cm)	8.89 x 44.45 x 48.26
Installed whole system total rack space height (rack spaces)	2U
Secondary form factor	Tower (requires 2-9USTAND)

Installed whole system dimensions in secondary form factor (height x width x depth / inches)	17.5 x 3.5 x 19
UPS dimensions in secondary form factor (height x width x depth / cm)	44.4 x 8.9 x 48.3
UPS / Power Module weight (lbs)	47.4
UPS / Power Module weight (kg)	21.5
UPS Shipping dimensions (height x width x depth / inches)	9.75 x 20.25 x 24.00
UPS Shipping dimensions (height x width x depth / cm)	24.77 x 51.44 x 60.96
Shipping weight (lbs)	57.3
Shipping weight (kg)	26
UPS housing material	Steel
Cooling method	Fan
ENVIRONMENTAL	
Operating Temperature Range	+32 to +104 degrees Fahrenheit / 0 to +40 degrees Celsius
Storage Temperature Range	+5 to +122 degrees Fahrenheit / -15 to +50 degrees Celsius
Relative Humidity	0 to 95%, non-condensing
AC mode BTU / hr. (full load)	812.9
AC economy mode BTU / hr. (full load)	347.2
Battery mode BTU / hr. (full load)	885.6
AC economy mode efficiency rating (100% load)	94%
COMMUNICATIONS	
Communications interface	USB (HID enabled); DB9 Serial; Contact closure; EPO (emergency power off); Slot for SNMP/Web interface
Network monitoring port description	Supports detailed monitoring of UPS and site power conditions; DB9 port supports RS232 and contact closure communications
PowerAlert software	Included
Communications cable	USB and DB9 cabling included
WatchDog compatibility	Supports Watchdog application, OS and hard-reboot restart options for remote applications
LINE / BATTERY TRANSFER	
Transfer time	No transfer time (0 ms.) in online, double-conversion mode
Low voltage transfer to battery power (setpoint)	80V (100% load), 65V (

High voltage transfer to battery power (setpoint)	138
SPECIAL FEATURES	
Cold Start (startup in battery mode during a power failure)	Cold-start operation supported
High availability UPS features	Automatic inverter bypass; Hot swappable batteries
Green & high efficiency features	High efficiency economy mode operation; Individually controllable load banks; Schedulable daily hours of economy mode operation
CERTIFICATIONS	
UPS Certifications	Tested to UL1778 (USA); Tested to CSA (Canada); Tested to NOM (Mexico); Meets FCC Part 15 Category A (EMI); Meets FCC Part 68 / Industrie Canada (telecommunications); ROHS (Reduction of Hazardous Substances)
WARRANTY & INSURANCE	
Standard warranty period	2 years
Connected equipment insurance (USA, Canada, Puerto Rico)	\$250,000 connected equipment insurance

Related Items

Extended Warranties		
WEXT3-2200-3000	3-Year Extended Warranty - For Smart Line-Interactive and Online Tower or Rack models, 2200-3000VA	Qty: [optional]
WEXT5-2200-3000	5-Year Extended Warranty - For Smart Line-Interactive and Online Tower or Rack models, 2200-3000VA or less	Qty: [optional]
External Battery Packs		
BP48V24-2U	BP48V242U - External Battery Pack for UPS System	Qty: [optional]
BP48V60RT-3U	External Battery Pack and Cable. 3U, Expandable, Blue 2-Point Connector	Qty: [optional]
Power Distribution		
PS7224	Tripp Lite Power Strip - Multiple outlets wherever you need them	Qty: [optional]
PDU1215	Basic PDU / Power Distribution Unit - Safe, reliable power distribution for critical networking equipment	Qty: [optional]
Rackmount/Wallmount Kits		
2POSTRMKITWM	Universal 2-Post Rackmount Kit (Supports 2U to 4U UPS systems and battery packs.)	Qty: [optional]
Shutdown Cable Kits		
AS400CABLE KIT	Power Management Tools - UPS Communication Cable Kit for System i / AS400 / iSeries Servers	Qty: [optional]
SNMP Accessories		
ENVIROSENSE	Monitors temperature, humidity and contact-closure inputs. (Requires SNMPWEBCARD or switched PDU.)	Qty: [optional]
SNMPWEBCARD	For remote monitoring and control via SNMP, Web or telnet.	Qty: [optional]
Surge Protectors		
DTEL2	Network Surge Suppressor - Essential protection for data and communication lines	Qty: [optional]
DNET1	Network Surge Suppressor - Essential protection for data and communication lines	Qty: [optional]
DCATV	Network Surge Suppressor - Essential protection for TV/VCR coaxial lines	Qty: [optional]

Tower Stands		
2-9USTAND	Tower Stand - Expandable Tower Base Stand UPS Accessory	Qty: [optional]

More information, including related products, owner's manuals, and additional technical specifications, can be found online at www.tripplite.com/en/products/model.cfm?txtModelID=2950.

Medium Type I Enclosures

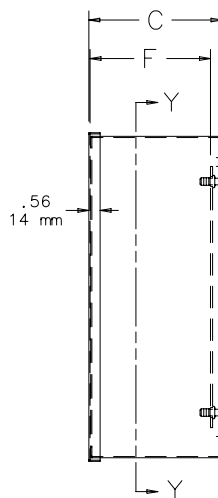
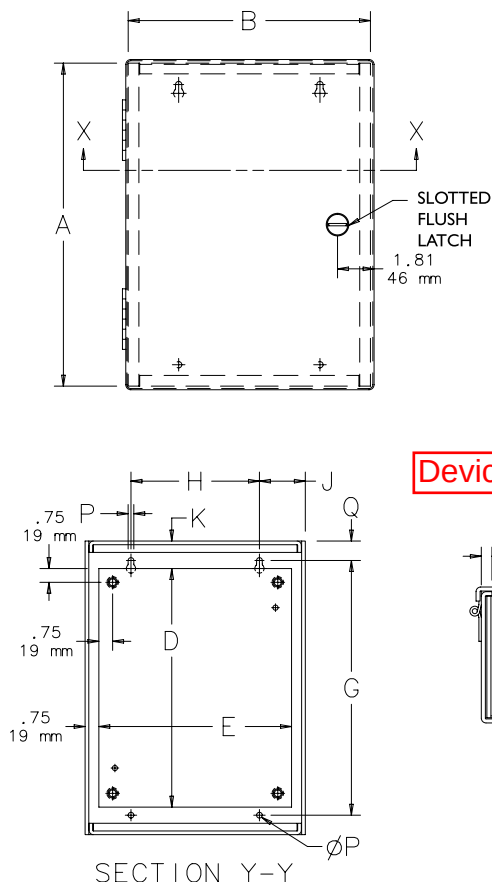


Application

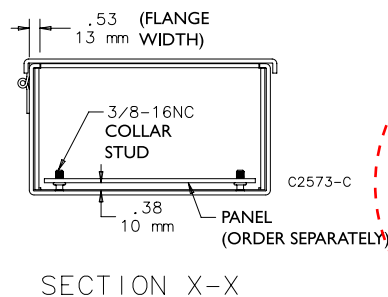
Designed for use in control and instrumentation applications in areas which do not require oiltight and dusttight specifications.

Features

- Doors have butt hinges
- Collar studs provided for mounting optional panel
- Slotted flush latches. Optional latches available.



Device for utilization



Construction

- 16 or 14 gauge steel
- Mounting holes on back of enclosure

Finish

ANSI 61 gray polyester powder paint finish inside and out over phosphatized surfaces. Optional solid panels are white and optional perforated panels are gray.

Industry Standards

UL 50, File No. E27567, Type I
NEMA/EEMAC Type I
CSA, File No. 42184, Type I
IEC 60529, IP30

Accessories

See also *Accessories* chapter.

Cylinder Lock Kit (AL12AR)

Electric Heater

Electrical Interlock

Ground Panels

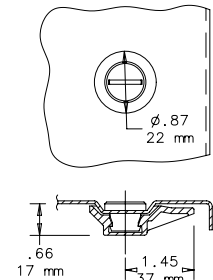
Rack Mounting Angle Kit

"T" Handle Latch Kit (AL7A)

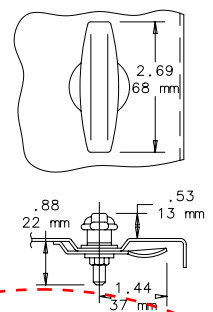
Touch-Up Paint (ATPPY6I)

Window Kit

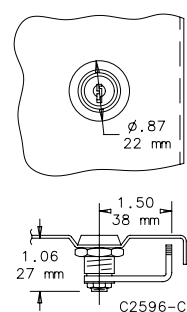
Standard Slotted Flush Latch



**“T” Handle
Latch Kit
AL7A (optional)**



**Cylinder Lock Kit
AL12AR (optional)**



Medium Type I Enclosures

Standard Sizes Medium Type I Enclosures

Catalog Number	A x B x C in. (mm)	Panel Catalog Number	Perforated Panel Catalog Number	Panel Size D x E in. (mm)	Panel Ga.	G (in.)	G (mm)	H (in.)	H (mm)	J (in.)	J (mm)	Q (in.)	Q (mm)	P (in.)	P (mm)	F (in.)	F (mm)	K (in.)	K (mm)
A16N12ALP	16.00 x 12.00 x 6.62 (406 x 305 x 168)	A16N12MP	A16N12MPP	13.00 x 10.50 (330 x 267)	14	13.88	353	7.00	178	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A16N16ALP	16.00 x 16.00 x 6.62 (406 x 406 x 168)	A16N16MP	A16N16MPP	13.00 x 14.50 (330 x 368)	14	13.88	353	11.00	279	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A16N20ALP	16.00 x 20.00 x 6.62 (406 x 508 x 168)	A16N20MP	A16N20MPP	13.00 x 18.50 (330 x 470)	14	13.88	353	15.00	381	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A20N16ALP	20.00 x 16.00 x 6.62 (508 x 406 x 168)	A20N16MP	A20N16MPP	17.00 x 14.50 (432 x 368)	14	17.88	454	11.00	279	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A20N20ALP	20.00 x 20.00 x 6.62 (508 x 508 x 168)	A20N20MP	A20N20MPP	17.00 x 18.50 (432 x 470)	14	17.88	454	15.00	381	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A24N16ALP	24.00 x 16.00 x 6.62 (610 x 406 x 168)	A24N16MP	A24N16MPP	21.00 x 14.50 (533 x 368)	14	21.88	556	11.00	279	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A24N20ALP	24.00 x 20.00 x 6.62 (610 x 508 x 168)	A24N20MP	A24N20MPP	21.00 x 18.50 (533 x 470)	14	21.88	556	15.00	381	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A24N24ALP	24.00 x 24.00 x 6.62 (610 x 610 x 168)	A24N24MP	A24N24MPP*	21.00 x 22.50 (533 x 572)	12	21.88	556	19.00	483	2.50	64	1.06	27	0.31	8	6.00	152	1.50	38
A30N24ALP	30.00 x 24.00 x 6.62 (762 x 610 x 168)	A30N24MP	A30N24MPP*	26.00 x 22.50 (660 x 572)	12	27.50	699	16.75	425	3.62	92	1.25	32	0.44	11	6.00	152	2.00	51
A36N24ALP	36.00 x 24.00 x 6.62 (914 x 610 x 168)	A36N24MP	A36N24MPP*	32.00 x 22.50 (813 x 572)	12	33.50	851	16.75	425	3.62	92	1.25	32	0.44	11	6.00	152	2.00	51
A36N30ALP	36.00 x 30.00 x 6.62 (914 x 762 x 168)	A36N30MP	A36N30MPP*	32.00 x 28.50 (813 x 724)	12	33.50	851	22.75	578	3.62	92	1.25	32	0.44	11	6.00	152	2.00	51
A16N12BLP	16.00 x 12.00 x 8.62 (406 x 305 x 219)	A16N12MP	A16N12MPP	13.00 x 10.50 (330 x 267)	14	13.88	353	7.00	178	2.50	64	1.06	27	0.31	8	8.00	203	1.50	38
A20N12BLP	20.00 x 12.00 x 8.62 (508 x 305 x 219)	A20N12MP	A20N12MPP	17.00 x 10.50 (432 x 267)	14	17.88	454	7.00	178	2.50	64	1.06	27	0.31	8	8.00	203	1.50	38
A20N16BLP	20.00 x 16.00 x 8.62 (508 x 406 x 219)	A20N16MP	A20N16MPP	17.00 x 14.50 (432 x 368)	14	17.88	454	11.00	279	2.50	64	1.06	27	0.31	8	8.00	203	1.50	38
A20N20BLP	20.00 x 20.00 x 8.62 (508 x 508 x 219)	A20N20MP	A20N20MPP	17.00 x 18.50 (432 x 470)	14	17.88	454	15.00	381	2.50	64	1.06	27	0.31	8	8.00	203	1.50	38
A24N20BLP	24.00 x 20.00 x 8.62 (610 x 508 x 219)	A24N20MP	A24N20MPP	21.00 x 18.50 (533 x 470)	14	21.88	556	15.00	381	2.50	64	1.06	27	0.31	8	8.00	203	1.50	38
A24N24BLP	24.00 x 24.00 x 8.62 (610 x 610 x 219)	A24N24MP	A24N24MPP*	21.00 x 22.50 (533 x 572)	12	21.88	556	19.00	483	2.50	64	1.06	27	0.31	8	8.00	203	1.50	38
A30N20BLP	30.00 x 20.00 x 8.62 (762 x 508 x 219)	A30N20MP	A30N20MPP*	26.00 x 18.50 (660 x 470)	12	27.50	699	15.00	381	2.50	64	1.25	32	0.44	11	8.00	203	2.00	51
A30N24BLP	30.00 x 24.00 x 8.62 (762 x 610 x 219)	A30N24MP	A30N24MPP*	26.00 x 22.50 (660 x 572)	12	27.50	699	16.75	425	3.62	92	1.25	32	0.44	11	8.00	203	2.00	51
A30N30BLP	30.00 x 30.00 x 8.62 (762 x 762 x 219)	A30N30MP	A30N30MPP*	32.00 x 28.50 (813 x 724)	12	27.50	699	22.75	578	3.62	92	1.25	32	0.44	11	8.00	203	2.00	51
A36N24BLP	36.00 x 24.00 x 8.62 (914 x 610 x 219)	A36N24MP	A36N24MPP*	32.00 x 22.50 (813 x 572)	12	33.50	851	16.75	425	3.62	92	1.25	32	0.44	11	8.00	203	2.00	51
A36N30BLP	36.00 x 30.00 x 8.62 (914 x 762 x 219)	A36N30MP	A36N30MPP*	32.00 x 28.50 (813 x 724)	12	33.50	851	22.75	578	3.62	92	1.25	32	0.44	11	8.00	203	2.00	51
A18N18CLP	18.00 x 18.00 x 10.62 (441 x 441 x 270)	A18N18MP	A18N18MPP	15.00 x 16.50 (381 x 419)	14	15.88	403	13.00	330	2.50	64	1.06	27	0.31	8	10.00	254	1.50	38
A24N20CLP	24.00 x 20.00 x 10.62 (610 x 508 x 270)	A24N20MP	A24N20MPP	21.00 x 18.50 (533 x 470)	14	21.88	556	15.00	381	2.50	64	1.06	27	0.31	8	10.00	254	1.50	38
A30N24CLP	30.00 x 24.00 x 10.62 (762 x 610 x 270)	A30N24MP	A30N24MPP	21.00 x 22.50 (533 x 572)	12	27.50	699	16.75	425	3.62	92	1.25	32	0.44	11	10.00	254	2.00	51
A24N24DLP	24.00 x 24.00 x 12.62 (610 x 610 x 321)	A24N24MP	A24N24MPP*	21.00 x 22.50 (533 x 572)	12	21.88	556	19.00	483	2.50	64	1.06	27	0.31	8	12.00	305	1.50	38
A30N24DLP	30.00 x 24.00 x 12.62 (762 x 610 x 321)	A30N24MP	A30N24MPP*	26.00 x 22.50 (660 x 724)	12	27.50	699	16.75	425	3.62	92	1.25	32	0.44	11	12.00	305	2.00	51
A36N30DLP	36.00 x 30.00 x 12.62 (914 x 762 x 321)	A36N30MP	A36N30MPP*	32.00 x 28.50 (813 x 724)	12	33.50	851	22.75	578	3.62	92	1.25	32	0.44	11	12.00	305	2.00	51

Devices for utilization

Purchase panels separately.

* Flanged on all four sides.

DVC-ST Chassis (4U)



DVR / GO!

DVC-EX Chassis (3U)



DVR / NVR / GO!

Overview

Lenel offers several powerful and easy-to-use video recording options for a multitude of digital video recorder and network video recorder applications. With flexibility to meet needs ranging from high-resolution to expansive online storage, Video Recorders from Lenel present many affordable options for those considering upgrading an existing analog installation to those looking for a fresh, network-centric solution. Video Recorders are available in stand-alone or integrated deployments. OnGuard GO! configurations provide powerful stand-alone systems for customers needing a DVR or NVR application. Additionally, OnGuard GO! customers can add access control and ID badging to the stand-alone video recorder without needing an additional server or database! No matter the application, Video Recorders from Lenel offer a powerful opportunity to address a critical staple in any security program.

Video Boards (DVB-408 & DVB-444)

Lenel offers two video boards, the DVB-408 and the DVB-444. Each board supports industry-leading MPEG-4 recording compression. The affordable DVB-408 has eight channels of capacity, while the DVB-444 has four channels and includes four on-board processors for more efficient compression. Both board options give customers the ability to start and expand robust video systems.

DVC-ST (4U)

The DVC-ST is a reliable, rack-mountable digital video recorder with several recording and storage options. The DVC-ST supports analog video recording with up to two DVB-408s, or up to two DVB-444s. Each DVC-ST has three hard drive bays for SATA, allowing customers to expand to greater than one terabyte of online storage. The DVC-ST includes a 4U, 19-inch rack mount digital storage recorder with Windows XP Professional, 10/100/1000 Ethernet, one 80 GB internal OS-only hard drive (optional 3 additional data hard drives), DVD/CD ROM, 1.44 floppy and mouse.

DVC-EX (3U)

The DVC-EX is a high-powered machine offering the most expansive storage capacity of any DVR available. With eight hard drive bays, the DVC-EX has capacity for four terabytes of online storage. In addition to storage, the DVC-EX also allows the customer to configure RAID 5 data redundancy. The DVC-EX includes a 3U, 19-inch rack mount digital storage recorder with Windows XP Professional, 10/100/1000 Ethernet, one 80 GB OS-hard drive (optional data hard drives, maximum of eight), DVD/CD ROM, 1.44 floppy, mouse and rack mount rail.

DVC-ES

The DVC-ES is an entry-level solution that is a great fit for small DVR applications. Available with a single DVB-408, the DVC-ES comes in a tower form factor for easy placement in any security office. It includes a tower chassis, digital storage recorder with Windows XP Professional, 10/100/1000 Ethernet, one 80 GB internal OS-only hard drive (optional 2 additional data hard drives), CD ROM, 1.44 floppy and mouse.

DVC-1U

The DVC-1U is a powerful and easy to use Network Video Recorder (NVR) with a small footprint. Occupying 1/4 to 1/3 the space of traditional video recorders, the 1U form factor can easily fit in empty rack slots, rarely requiring additional racks to house it. The DVC-1U includes a 1U rack-mount chassis, digital storage recorder with Windows XP Professional, two 10/100/1000 Ethernet ports, one 80 GB internal OS-only hard drive, one 500 GB internal Data Storage Drive (optional 2 additional data hard drives), and CD/RW-DVD/R.

DVC-DELL

The DVC-DELL features a trusted hardware standard supporting an entry-level NVR application. The Dell solution offers IT-centric security operations the ability to develop a video program using a factory-tested server configuration that optimizes performance and ensures reliability.

Stand-alone Video Recorders - OnGuard GO! (DVC-ST, DVC-EX & DVC-1U)

Customers looking for stand-alone digital video recorders can use a Lenel video recorder with the OnGuard GO! configurations. The stand-alone video recorder's OnGuard GO! configuration has the administration applications and database on the video recorder, saving money by not requiring a separate security server to launch the most powerful security system available. Furthermore, customers can take the single stand-alone video recorder and add OnGuard's robust Access Control, Fire & Intrusion and ID Management applications, as well as countless software options. For customers expanding an existing analog environment by upgrading to a DVR or by embracing IP by migrating to network video, Lenel video recorders offer the flexibility to initiate an integrated security architecture by focusing on stand-alone digital video, then expanding the system when the time is right.

DVC-ES Chassis



DVR

DVC-1U



NVR / GO!

DVC-DELL



NVR / GO!



ICT 220 DN Plus

Full D1 resolution with a true de-interlaced filter produces brilliant, artifact-free video. Using state-of-the-art MPEG-4 (video) and synchronized ADPCM (audio) encoding, the ICT 220 provides superior video quality and improved network performance. The ICT 220 outperforms the competition, when compared to other network cameras using still picture encoding technology such as MJPEG or Wavelet. The ICT 220 utilizes superior cross bit rate encoding technology, ixBR Control®, to deliver powerful bandwidth control. Using ixBR, digital video streams more fluidly because the data is encoded and streamed at a constant rate, yet it retains all the rich data of variable bit rate encoding!

Key Features

- 3 Axis MiniDome (360° horizontal x 90° vertical)
- Powerful MPEG-4 video compression
 - Supports up to 30 frames per second at full D1 resolution
- True de-interlaced filter
- Bidirectional G.711 and G.726 audio communication
- Synchronized full-duplex one channel audio and video
- State-of-the-art CPU, separate codec and embedded software
- Intelligent bit rate control (flexible for difficult network environments)
- Embedded streaming server and embedded Web server
- Motion-detected and event-triggered alarm processing
- Sensor-triggered recording and FTP:
 - One (1) alarm input
 - One (1) relay output
- Supports a wide range of network protocols
- 1/3 in. (8 mm) Sony Super HAD CCD
 - 410K CCD Day-Night with IR cut filter varifocal lens
 - 410K CCD standard varifocal lens
 - 270K CCD fixed lens
- True Day-Night capability
- System time management
 - RTC with Time Server synchronization
- Security support:
 - User authentication
 - 128-bit encrypted data stream (selectable, for added security)



Resolution

- NTSC: 30 fps ■ NTSC: 704x480 / 352x240 / 176x144
- PAL: 25 fps ■ PAL: 704x576 / 352x288 / 176x144

Certifications

- UL ■ CE
- ULC ■ CCC
- FCC ■ RoHS

Power and Ethernet

- Power supply input voltage: 100~250 VAC 50-60 Hz
- Power supply output voltage: 12 VAC @ 3.3 A
- AC power cable capacity: 250 VAC, 10~16 A
- Camera power input: 7~23V DC Max 8 Watts
- Mid span PoE injector power input: 12V DC 1 Amp
- Power supply connector type: N (male)
- Ethernet: 10/100Base-T autosensing

RCA Analog Display Cable

RCA analog cable is for analog video output from camera module inside of network camera. Use with handheld video monitor for quick and easy focus and field of view setup. Connects to video output.

Package Contents

- Camera
- Power supply
- Type N male power connector with leads
- Single port mid span PoE injector
- Power cords
- CD-ROM with software & user guide
- RCA analog display cable
- Install template and mounting screws

Camera Dimensions

- 5.6 x 5 in. (142 mm x 128 mm)

Part Number by Model and Region

Region	Model – ICT220 DN Plus (410KCCD- Day-Night)	Model- ICT220S (410KCCD)	Model- ICT220S (270KCCD)
Americas- Asia Pacific	ICT2201DN	ICT2201S	ICT2201
Australia	ICT2202DN	ICT2202S	ICT2202
UK	ICT2203DN	ICT2203S	ICT2203
Europe	ICT2204DN	ICT2204S	ICT2204

Lens

Model	Lens	Minimum Illumination (Lux)
ICT220DN Plus	Varifocal 4.0 – 9.0 mm F1.2	0.1Lux / f=1.4 (AGC 0n)
ICT220S	Varifocal 4.0 – 9.0 mm F1.2	0.1Lux / f=1.4 (AGC 0n)
ICT220	Fixed 3.8 mm F2.0 manual focus	0.3Lux



QD104 Series Digital Quad Video Processor

COLOR/BLACK-WHITE, ALARMS

Product Features

- High-Quality Quad Display (1024H x 512V)
- Real-Time Quad Video
- Low Cost
- Four Camera Inputs with Four Looping Outputs
- Quad Monitor Output That Displays Continuous Four-Camera Image
- Call Monitor Output That Displays Full-Screen or Quad Image
- Sequencing of Full-Screen and Quad Views
- Automatic Time-Base Correction Eliminates the Need for Camera Synchronization
- Five Alarm Inputs, One Alarm Output

The **QD104 Series Quad** is a high quality, low cost, color/black-white video processor capable of displaying full-screen or quad views of four camera inputs.

A quad monitor output displays a continuous quad image. For greater versatility, a call monitor output offers several additional viewing options. For more detail or easier viewing, the call monitor output can display a full-screen view of any camera output. Or this output can be used to display the quad image on a second monitor. And the call monitor output supports sequencing. Sequencing can include full-screen views of any of the four cameras as well as the quad image. Camera selection and sequence programming for the call monitor is done with front panel push buttons.

All camera inputs have looping outputs that add to the capability of the quad by providing connections for additional video equipment.

A real-time quad update rate assures live video on all camera outputs. And automatic time base correction means no external synchronization of cameras is required. If any camera input loses video, the monitor display for that camera appears black.



There are five alarm inputs, one for each of the four cameras, plus one for the quad input. When there is an alarm, that camera is switched to the call monitor's output for the duration of the alarm or until an operator acknowledges the alarm by pressing the front panel button associated with the alarmed camera. Multiple alarms will sequence at a two-second rate. An alarm output can trigger a VCR or an external alarm indicator, such as a light or buzzer.

The quad comes in a desktop cabinet of the same style as the Genex® Series multiplexer. A 9-inch (23 cm) monitor can be placed on top of the unit. A separate rack kit provides all the hardware necessary to mount one or two quads in a standard 19-inch (48 cm) equipment rack. The rack kit includes a filler panel when installing a single quad.



TECHNICAL SPECIFICATIONS

MODELS

QD104C	Color quad, NTSC, 120 VAC, 60 Hz
QD104M	Black-white quad, EIA, 120 VAC, 60 Hz

VIDEO

Input Level	1 Vp-p, composite
Video Standard	525 lines, 60 fields/second
Digital Image	1024 (H) x 512 (V) pixels
Quad Update Rate	Real time
Analog Frequency Response	Better than 12 MHz
Crosstalk at Color Subcarrier	Better than -60 dB
Differential Gain	Less than 2 percent
Differential Phase	Less than 2 degrees
Signal-to-Noise Ratio	Better than -60 dB

ELECTRICAL

Operating Voltage	12 VAC; unit includes power supply
Power	6 watts
Video Inputs	Four, BNC, looping, 75-ohm/Hi Z termination
Monitor Outputs	Two, BNC, 75 ohms
Alarm Inputs	Five N.O. inputs
Alarm Output	10K ohm output resistance; TTL, CMOS compatible
Alarm Clearance	Automatic with manual override
Sequence Dwell Times	Programmable for 2, 4, 8, or 16 seconds

GENERAL

Operating Temperature	32° to 120°F (0° to 49°C)
Relative Humidity	95%, non-condensing
Dimensions	1.73" H x 10.20" D x 8.44" W (4.39 x 25.90 x 21.43 cm)
Finish	Charcoal gray
Unit Weight	3 lb (1.36 kg)
Shipping Weight	4 lb (1.81 kg) approximate

CERTIFICATIONS

- FCC, Class B (QD104C)
- FCC, Class A (QD104M)

OPTIONAL ACCESSORIES

RK100	Rack-mount kit (1 RU) for mounting one or two QD100 Series Quads in a standard 19-inch rack. Blank filler panel provided.
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Notice: Judgment as to the suitability of the products for users' purposes is solely the users' responsibility. Users should refer to the Operation manuals for cautionary statements regarding user selected options and how they might affect video quality. Users shall determine the suitability of the products for their own intended application, picture rate and picture quality. In the event users intend to use the video for evidentiary purposes in a judicial proceeding or otherwise, users should consult with their attorney regarding any particular requirements for such use.



Pelco Worldwide Headquarters:

3500 Pelco Way, Clovis, California 93612-5699 USA
USA & Canada Tel: (800) 289-9100 • FAX (800) 289-9150
International Tel: (559) 292-1981 • FAX (559) 348-1120
www.pelco.com

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R2416UL, R2416ULCB UL Listed Rack Mount CCTV Power Supply

Rev. DSR2416UL - A27F

Overview



- These Altronix AC Rack Mount CCTV Power Supplies provide 24VAC or 28VAC distributed via sixteen (16) fuse or Class 2 Rated PTC protected power limited outputs for powering CCTV Cameras, heaters and other video accessories.

R2416UL

- Sixteen (16) fuse protected outputs.
- Outputs are rated @ 3.5 amp.

R2416ULCB

- Sixteen (16) Class 2 Rated PTC protected power limited outputs.
- Outputs are rated @ 2.5 amp.

Specifications

- 24VAC @ 7 amp (170VA) or 28VAC @ 6 amp (170VA) supply current.
- Input 115VAC, 50/60Hz, 3 amp.
- Surge suppression.
- Illuminated power disconnect circuit breaker with manual reset.
- Removable terminal blocks w/locking screw flanges.
- 3-wire grounded line cord.
- Individual power LEDs.
- Spare fuse(s) provided (fuse protected model only).
- Unit maintains camera synchronization.
- Ease of installation saves time and eliminates costly labor.
- 2U rack mount chassis for use in standard EIA 19" rack.
- Product weight:
 - R2416UL: 14.8 lbs.
 - R2416ULCB: 15.7 lbs.
- Shipping weight:
 - R2416UL: 15.8 lbs.
 - R2416ULCB: 16.7 lbs.

Agency Approvals



UL Listed for Commercial CCTV Equipment (UL 2044).

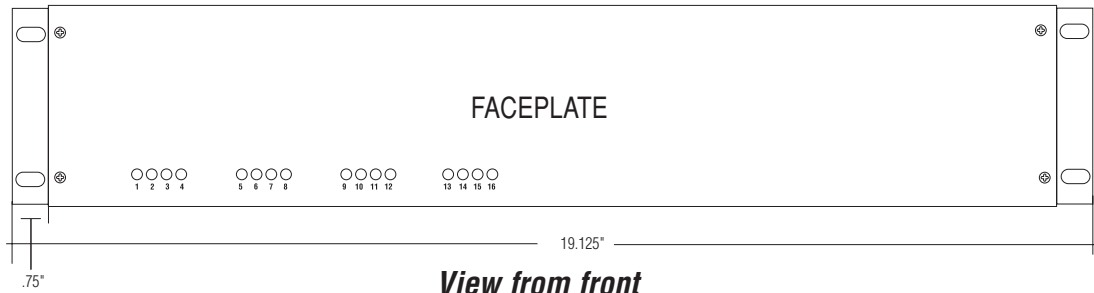
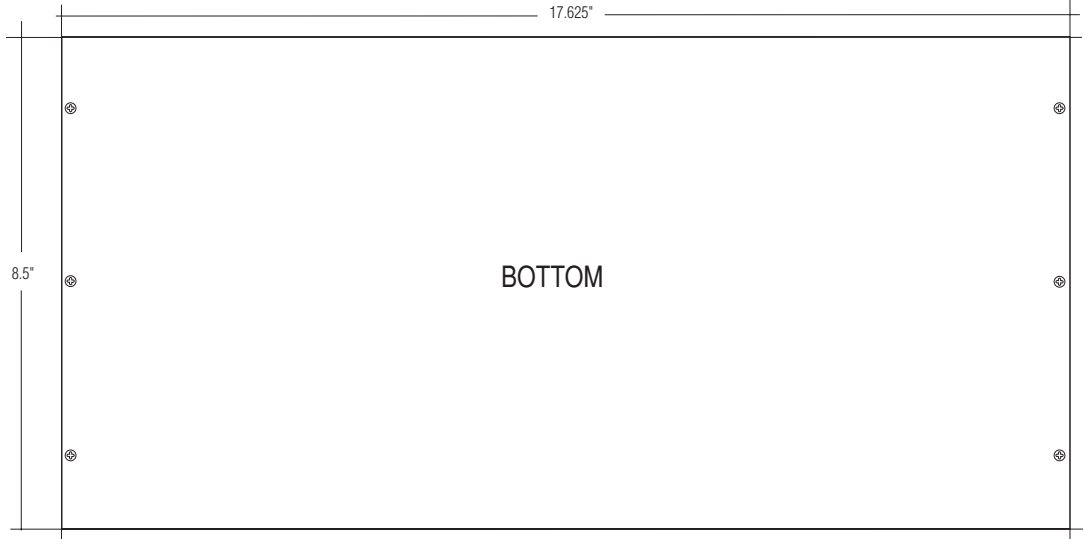
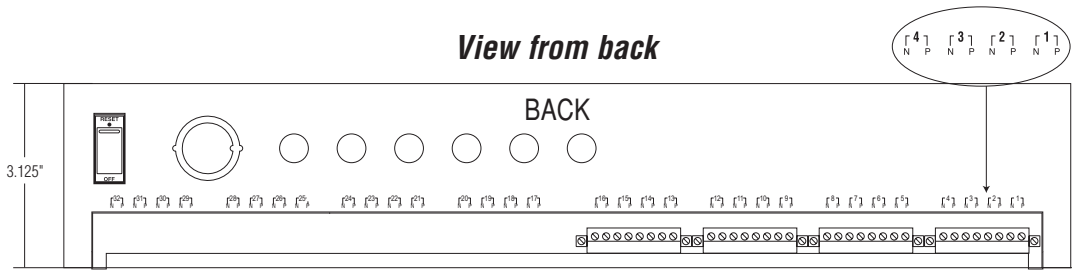


CUL Listed - CSA Standard C22.2 No.1-98, Audio, Video and Similar Equipment.

Enclosure Dimensions

3.25"H x 19.125"W x 8.5"D

View from back



View from front

Cisco Catalyst 2955 Series Switches

Cisco® Catalyst® 2955 Series Switches are industrial-grade switching products that provide wire-speed Fast Ethernet and Gigabit Ethernet connectivity for deployment in harsh environments. The Cisco Catalyst 2955 Series operates in environments such as industrial networking solutions (industrial Ethernet deployments), intelligent transportation systems (ITS), and transportation network solutions. It integrates into military equipment, Supervisory Control and Data Acquisition (SCADA) systems, power generation systems, waste water treatment facilities, building automation systems, warehouses, and any other facilities or applications where the environmental conditions or suspended solid concentrations exceed the specifications of other commercial switching products. The Cisco Catalyst 2955 Series uses industrial-grade components, a compact form factor, convection cooling, and relay output signaling to extend intelligent services such as enhanced security, high availability, and advanced quality of service (QoS) to areas that cannot be served by traditional commercial-grade Ethernet switches.

Embedded in all Cisco Catalyst 2955 Series Switches is the Cisco Device Manager software, which allows users to easily configure and monitor the switch using a standard Web browser, eliminating the need for more complex terminal emulation programs and knowledge of the command-line interface (CLI). Customers can easily initialize the switch with Web-based Cisco Express Setup, without using the CLI. In addition, with Cisco Network Assistant, a standalone network management application, customers can simultaneously configure and troubleshoot multiple Cisco Catalyst desktop switches. Cisco Device Manager, Cisco Express Setup, and Cisco Network Assistant reduce the cost of deployment by enabling less-skilled personnel to set up switches quickly. Furthermore, Cisco Catalyst 2955 Series Switches provide extensive management tools using Simple Network Management Protocol (SNMP) network management platforms such as CiscoWorks.

This product line offers Cisco IOS® Software functionality for traditional data, video, and voice services, with enhanced intelligent services features for additional security, advanced QoS, and high availability. Intelligent services are critical in supporting the reliability and determinism of proprietary Layer 2 solutions typical of industrial Ethernet deployments, while providing the advantages (standardization, open connectivity, bandwidth, integration, etc.) of an advanced Ethernet switching architecture. These intelligent services include Layers 2-4 traffic prioritization, rate limiting, and security filtering, helping to ensure the high uptime, low latency, deterministic performance, and data integrity critical for industrial automation control networks.

Cisco Catalyst 2955 Series Switches consist of the following devices:

- **Cisco Catalyst 2955T-12**—Twelve 10/100 ports and two fixed 10/100/1000BASE-T uplink ports
- **Cisco Catalyst 2955C-12**—Twelve 10/100 ports and two fixed 100BASE-FX multimode uplink ports

- **Cisco Catalyst 2955S-12**—Twelve 10/100 ports and two fixed 100BASE-LX single-mode uplink ports

Intelligence in the New Ethernet Networks

Currently, non-Ethernet Layer 2 networks are evolving from traditional field buses or proprietary technologies to standards-based Ethernet networks. The progression to Ethernet is driven by a multitude of factors, including:

- **Standardization**—There are hundreds of millions of Ethernet devices around the world; Ethernet has become the prevalent Layer 2 technology based on widely adopted standards.
- **IP Connectivity**—Ethernet is the most ubiquitous Layer 2 technology for Internet connectivity, in turn providing unprecedented communications potential to networks that have been traditionally isolated.
- **Bandwidth**—Orders of magnitude above other existing technologies, Ethernet takes advantage of the increased computational power of the new network hosts (I/O devices, motion machinery, sensors, intelligent electronic devices, etc.) being deployed today. This allows for real-time control and data gathering for a multitude of applications that were not previously feasible, including preventive maintenance, total quality control monitoring, remote monitoring, and asset management and optimization.
- **Multiple services on a single infrastructure**—Intelligent Ethernet allows a single network to carry multiple vendor implementations of control (EtherNet/IP, Modbus TCP, Foundation Fieldbus High Speed Ethernet [HSE] and various Advanced Traffic Management Systems [ATMSs]), and to use the same investment to also deliver traditional voice (telephony), data (e-mail, technical support, and browsing), and video services (video monitoring).
- **Multilayer Integration**—All of the elements described above allow for the integration of higher-level applications such as enterprise resource planning (ERP), manufacturing execution systems (MES), and advanced traffic management systems to the floor control layer (programmable logic controllers [PLCs], PC-based control systems, traffic control equipment, and human-machine interfaces [HMI]). This allows for a true flow of data and automation from the demand side (customer placing and order) to the factory floor (assembly line) or from the monitoring devices in a freeway all the way to the emergency response systems, as well as real-time control in SCADA applications. As organizations increasingly rely on Ethernet networks, it is important to help ensure high availability, security, scalability, and control. By adding Cisco IOS Software functionality to new network applications, users can now deploy network-wide intelligent services that address these requirements in a consistent way—from the I/O or monitoring device to the core and through the WAN.

Network Security through Advanced Security Features

Cisco Catalyst 2955 Series Switches offer enhanced data security through numerous security features. These features allow customers to enhance network security with capabilities to secure traffic through the protection of passwords and configuration information; to provide options for network security based on users, ports, and Media Access Control (MAC) addresses; and to enable more immediate reactions to intruder and hacker detection.

Secure Shell (SSH) Protocol and SNMPv3 protect information from tampering or eavesdropping by encrypting information being passed along the network, thereby guarding administrative information. Private VLAN Edge isolates ports on a switch, helping ensure that traffic travels directly from the entry point to the aggregation device through a virtual path and cannot be directed to another port.

Port-based access control parameters (ACPs) restrict sensitive portions of the network by denying packets based on source and destination MAC addresses, IP addresses, or Transmission Control Protocol/User Datagram Protocol (TCP/UDP) ports. ACP lookups are done in hardware, so forwarding performance is not compromised when implementing this type of security in the network. In addition, time-based ACPs allow configuration of differentiated services based on time periods. ACPs can also be applied to filter traffic based on differentiated services code point (DSCP) values. Port security provides another means to help ensure that appropriate users are on the network, by limiting access based on MAC addresses.

For authentication of users with a Terminal Access Controller Access Control System (TACACS+) or RADIUS server, 802.1x provides port-level security. 802.1x in conjunction with a RADIUS server allows for dynamic port-based user authentication. 802.1x-based user authentication can be extended to dynamically assign a virtual LAN (VLAN) based on a specific user, regardless of where that user connects on the network. This intelligent adaptability provides greater flexibility and mobility to the network's stratified user populations. By combining access control and user profiles with secure network connectivity, services, and applications, customers can more effectively manage user mobility and drastically reduce the overhead associated with granting and managing access to network resources.

With multilayer Cisco Catalyst 2955 Series Switches, network managers can implement high levels of console security. Multilevel access security on the switch console and a Web-based management interface prevent unauthorized users from accessing or altering switch configurations. TACACS+ or RADIUS authentication enable centralized access control of the switch and restrict unauthorized users from altering the configuration. Deploying security can be done through Cisco Network Assistant security wizards, which ease the deployment of security features that restrict user access to a server, a portion of the network, or the entire network.

Network Control through Advanced QoS and Rate Limiting

Cisco Catalyst 2955 Series Switches offer superior and highly granular QoS based on Layers 2–4 information, to help ensure that network traffic is classified and prioritized, and that congestion is avoided in the best possible manner. These switches can classify, reclassify, police (determine if the packet is in or out of predetermined profiles and affect actions on the packet), and mark or drop the incoming packets before the packet is placed in the shared buffer. Packet classification allows the network elements to discriminate between various traffic flows and to enforce rate-limiting policies based on Layer 2 and Layer 3 QoS fields.

To implement QoS, these switches first identify traffic flows or packet groups. They classify or reclassify these groups using the DSCP field in the IP packet and/or the 802.1p class of service (CoS) field in the Ethernet packet. Classification and reclassification can also be based on criteria as specific as the source or destination IP address, source or destination MAC address, or the Layer 4 TCP/UDP ports. At the ingress (incoming port) level, Cisco Catalyst 2955 Series Switches can also perform policing and marking of the packet.

After the packet goes through classification, policing, and marking, it is assigned to the appropriate queue before exiting the switch. Cisco Catalyst 2955 Series Switches support four egress (outgoing port) queues per port, allowing the network administrator to be more discriminating and specific in assigning priorities for the various applications on the network. At the egress level, the switch performs scheduling—an algorithm that determines the order in which the queues are processed. The switches support Weighted Round Robin (WRR) scheduling, strict priority queuing or strict priority scheduling. The WRR scheduling algorithm helps ensure that lower-priority packets are not entirely starved for bandwidth and are serviced without compromising the priority settings administered by the network manager. Strict priority scheduling helps ensure that higher-priority packets will always get serviced first, ahead of other traffic in lower-priority queues.

These features allow for prioritization of mission-critical, such as motion-control traffic, critical I/O or sensor data, video monitoring of security areas over voice (IP telephony traffic), ERP (Oracle, SAP, etc.), and CAD/CAM, which, in turn, would be scheduled to have precedence over less time-sensitive applications such as FTP or e-mail (SMTP). For example, it would be highly undesirable to have a large file download destined to one port on a switch and have quality implications, such as increased latency in industrial control traffic, destined to another port on the switch. This condition is avoided by helping ensure that the control traffic is properly classified and prioritized throughout the network. Other applications, such as Web browsing, can be treated as low priority and handled on a best-efforts basis.

Cisco Catalyst 2955 Series Switches allocate bandwidth based on several criteria, including MAC source address, MAC destination address, IP source address, IP destination address, and TCP/UDP port number. Bandwidth allocation is essential in network environments that require service-level agreements, or when it is necessary for the network manager to control the bandwidth given to certain users. Cisco Catalyst 2955 Series Switches support up to six policers per Fast Ethernet port and up to 60 policers on a Gigabit Ethernet port. This gives the network administrator granular control of the network bandwidth.

Network Availability

To provide efficient use of resources for bandwidth-hungry applications like multicasts (common in producer-consumer data distribution models), intelligent Cisco Catalyst 2955 Series Switches support Internet Group Management Protocol (IGMP) snooping in hardware. Through the support and configuration of IGMP snooping via Cisco Network Assistant, Cisco Catalyst 2955 Series Switches deliver outstanding performance and ease of use in administering and managing multicast applications on the LAN.

The IGMP snooping feature allows the switch to "listen in on" the IGMP conversation between hosts. When a switch hears an "IGMP join" request from a host for a given multicast group, the switch adds the host's port number to the group destination address (GDA) list for that group. When the switch hears an "IGMP leave" request, it removes the host's port from the Content Addressable Memory (CAM) table entry.

Per VLAN Spanning Tree Plus (PVST+) allows users to implement redundant uplinks while distributing traffic loads across multiple links. This is not possible with standard Spanning-Tree Protocol implementations. Cisco UplinkFast technology helps ensure immediate transfer to the secondary uplink, a vast improvement over the traditional 30-to-60-second convergence time.

Network Management

Customers can configure one switch at a time with the embedded Cisco Device Manager or configure and troubleshoot multiple switches with Cisco Network Assistant, a standalone network management software application optimized for LANs of small and medium-sized businesses with up to 250 users. Cisco Device Manager offers a simple and intuitive GUI interface for configuring and monitoring the switch. The software is Web-based and embedded in Cisco Catalyst 3750, 3650, 3550, 2970, 2960, 2955, 2950, and 2940 Series Switches. Cisco Device Manager reduces the cost of deployment by enabling less-skilled personnel to quickly and simply set up switches.

Cisco Network Assistant software provides an integrated management interface for delivering intelligent services, such as multilayer switching, QoS, multicast, and security ACLs. Cisco Network Assistant software allows administrators make use of benefits formerly reserved for only the most advanced networks without having to learn the CLI, or even the details of the technology. With Cisco Network Assistant, customers can configure multiple ports and switches simultaneously, perform software updates across multiple switches at once, and copy configurations to other switches for rapid network deployments. Bandwidth graphs and link reports provide useful diagnostic information, and the topology map gives network administrators a quick view of the network status. Cisco Network Assistant supports a wide range of Cisco Catalyst intelligent switches from Cisco Catalyst 2940 through Cisco Catalyst 4506. Through a user-friendly GUI, users can configure and manage a wide array of switch functions and start the device manager of Cisco routers and Cisco wireless access points.

The Cisco Network Assistant Software Guide Mode leads the user step by step through the configuration of advanced features and provides enhanced online help for context-sensitive assistance. Cisco AVVID (Architecture for Voice, Video and Integrated Data) wizards provide automated configuration of the switch to optimally support video streaming or videoconferencing, voice over IP (VoIP), and mission-critical applications. In addition, Smartports offers a set of verified feature macros per connection type in an easy-to-apply manner. With these macros, users can consistently and reliably configure essential security, availability, quality of service, and manageability features recommended for Cisco Business-Ready Campus solutions with minimal effort and expertise. These wizards and Smartports can save hours of time for network administrators, eliminate human errors, and help ensure that the configuration of the switch is optimized for these applications.

In addition to Cisco Network Assistant software, Cisco Catalyst 2955 Series Switches provide extensive management tools using SNMP network management platforms such as CiscoWorks. Managed with CiscoWorks, Cisco Catalyst switches can be configured and managed to deliver end-to-end device, VLAN, traffic, and policy management. Coupled with CiscoWorks, Cisco Resource Manager Essentials, a Web-based management tool, offers automated inventory collection, software deployment, easy tracking of network changes, views into device availability, and quick isolation of error conditions.

Enhanced Hardware Features

The Cisco Catalyst 2955 Switch has been designed for deployment in harsh environments. Through the use of special thermal design techniques and industrial-rated components, the Cisco Catalyst 2955 is rated to operate at extreme temperatures (-40° to 60°C; -40° to 140°F). Robust mechanical specifications allow for its deployment as a mobile platform and under extreme vibration and shock environments (50G trapezoidal shock pulse). The compact form factor, DIN rail mounting, and dual cabling orientations facilitate its deployment into industrial enclosures, traffic control cabinets, and transportation vehicles. Two normally open relays can be associated with the different port alarms, power alarms, and high temperature conditions to send an output signal to other external mechanisms (visible or audible alarms, for example), HMI's, or PLC's for a controlled shutdown. Dual power inputs provide for optional redundant power supplies, guaranteeing an even higher level of resiliency and reliability.

Figure 1. Cisco Catalyst 2955 Series Switches



Table 1. Product Features and Benefits

Feature	Benefit
Availability	
Superior redundancy for fault backup	• IEEE 802.1D Spanning-Tree Protocol support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance. • Support for Cisco Spanning-Tree Protocol enhancements such as UplinkFast, BackboneFast, and PortFast technologies helps ensure quick failover recovery, enhancing overall network stability and availability. • IEEE 802.1w Rapid Spanning-Tree Protocol (RSTP) provides rapid convergence of the spanning tree, independent of spanning tree timers. • Per VLAN Rapid Spanning Tree (PVRST+) allows rapid spanning-tree reconvergence on a per-VLAN spanning-tree basis, without requiring the implementation of spanning-tree instances. • Provides unidirectional link detection (UDLD) and Aggressive UDLD for detecting and disabling unidirectional links on fiber-optic interfaces caused by incorrect fiber-optic wiring or port faults.

Feature	Benefit
Integrated Cisco IOS Software features for bandwidth optimization	• Bandwidth aggregation of up to 4 Gbps (two ports full duplex) through Cisco Gigabit EtherChannel[®] technology and up to 1.6 Gbps (eight ports full duplex) through Fast EtherChannel technology enhances fault tolerance and offers higher-speed aggregated bandwidth between switches, to routers and individual servers. Port Aggregation Protocol (PAgP) is available to simplify configuration. • VLAN1 minimization allows VLAN1 to be disabled on any individual VLAN trunk link. • Per-port broadcast, multicast, and unicast storm control prevents faulty end stations from degrading overall system performance. • Per virtual LAN (VLAN) Spanning Tree Plus (PVST+) allows for Layer 2 load sharing on redundant links, to efficiently use the extra capacity inherent in a redundant design. • IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) allows a spanning-tree instance per VLAN, enabling Layer 2 load sharing on redundant links. • VLAN Trunking Protocol (VTP) pruning limits bandwidth consumption on VTP trunks by flooding broadcast traffic only on trunk links required to reach the destination devices. Dynamic Trunking Protocol (DTP) enables dynamic trunk configuration across all ports on the switch. • Internet Group Management Protocol Version 3 (IGMPv3) snooping provides for fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to only the requestors. Multicast VLAN Registration MVR, IGMP filtering, and fast-join and immediate leave are available as enhancements. The number of IGMP groups can be limited with IGMP throttling. IGMP Snooping time can be adjusted to optimize the performance of multicast data flows. • MVR continuously sends multicast streams in a multicast VLAN while isolating the streams from subscriber VLANs for bandwidth and security reasons. • Supports additional frame formats: Ethernet II (tagged and untagged), 802.3 (SNAP encapsulated, tagged and untagged frames).
Security	

Feature	Benefit
Network Security Features	• Filtering of incoming traffic flows based on Layer 2, Layer 3, or Layer 4 ACPs prevents unauthorized data flows. ◦ The following Layer 2 ACPs or a combination can be used for security classification of incoming packets: source MAC address, destination MAC address, and 16-bit Ethertype. ◦ The following Layer 3 and Layer 4 fields or a combination can be used for security classification of incoming packets: source IP address, destination IP address, TCP source or destination port number, UDP source, or destination port number. ACLs can also be used to filter based on DSCP values. ◦ Time-based ACLs allow configuration of differentiated services based on time periods. • Private VLAN edge provides security and isolation between ports on a switch, helping ensure that voice traffic travels directly from its entry point to the aggregation device through a virtual path and cannot be directed to a different port. • Support for the 802.1x standard allows users to be authenticated, regardless of which LAN port they are accessing, and provides unique benefits to customers who have a large base of mobile (wireless) users accessing the network. ◦ IEEE 802.1x with VLAN assignment allows a dynamic VLAN assignment for a specific user, regardless of where the user is connected. ◦ IEEE 802.1x with voice VLAN gives an IP phone access to the voice VLAN, regardless of the authorized or unauthorized state of the port. ◦ IEEE 802.1x with port security authenticates the port and manages network access for all MAC addresses, including the clients'. ◦ IEEE 802.1x with guest VLAN allows guests without 802.1x clients to have limited network access on the guest VLAN. • SSHv2 and SNMPv3 provide network security by encrypting administrator traffic during Telnet and SNMP sessions. SSHv2 and the crypto version of SNMPv3 require a special crypto software image because of U.S. export restrictions. • Port Security and unicast MAC filtering secure the access to a port based on MAC addresses. The aging feature of port security removes the MAC address from the switch after a specific time frame to allow another device to connect to the same port. Unicast MAC filtering allows non-IP packets to be filtered as well. • With unknown unicast/multicast port blocking, the switch will not flood packets with unknown destination MAC addresses to all Ethernet ports. Unknown unicast/multicast port blocking disables flooding on a per-port basis. • MAC address notification allows administrators to be notified of new users added or removed from the network. • Spanning-tree root guard (STRG) prevents edge devices not in the network administrator's control from becoming Spanning-Tree Protocol root nodes. • The Spanning-Tree Protocol PortFast/bridge protocol data unit (BPDU) guard feature disables access ports with Spanning-Tree Protocol PortFast enabled upon reception of a BPDU, and increases network reliability, manageability, and security. • Multilevel console access security prevents unauthorized users from altering the switch configuration. • TACACS+ and RADIUS authentication enables centralized control of the switch and restricts unauthorized users from altering the configuration. • The user-selectable address-learning mode simplifies configuration and enhances security. • Trusted Boundary provides the ability to trust the QoS priority settings if a Cisco IP phone is present and to disable the trust setting if the IP phone is removed, preventing a rogue user from overriding prioritization policies in the network. • IGMP Filtering provides multicast authentication by filtering out nonsubscribers and limits the number of concurrent multicast streams available per port. • Support for dynamic VLAN assignment through implementation of VLAN Membership Policy Server (VMPS) client functionality provides flexibility in assigning ports to VLANs. Dynamic VLAN enables fast assignment of IP addresses. • SPAN support of intrusion detection systems (IDSs) to monitor, repel, and report network security violations. • Cisco Network Assistant software security wizards ease the deployment of security features for restricting user access to a server, a portion of the network, or the network.
QoS	

Feature	Benefit
Overview	- The switches support the aggregate QoS model by enabling classification, policing/metering, and marking functions on a per-port basis at ingress and queuing/scheduling functions at egress. - The switches support configuring QoS ACPs on all ports, using ACPs to help ensure proper policing and marking on a per-packet basis. Up to four ACPs per switch are supported in configuring either QoS ACPs or security filters. - Automatic QoS (Auto-QoS) greatly simplifies the configuration of QoS in voice-over-IP (VoIP) networks by issuing interface and global switch commands that allow the detection of Cisco IP phones, the classification of traffic, and egress queue configuration.
QoS Classification Support at Ingress	- The switches support QoS classification of incoming packets for QoS flows based on Layer 2, Layer 3, and Layer 4 fields. - The following Layer 2 fields (or a combination) can be used for classifying incoming packets to define QoS flows: source/destination MAC address or 16-bit Ethertype. - The switches support identification of traffic based on Layer 3 type of service (ToS) field DSCP values. - The following Layer 3 and Layer 4 fields (or a combination) can be used to classify incoming packets to define QoS flows: source/destination IP address, TCP source/destination port number, or UDP source/destination port number.
QoS metering/policing at ingress	- Support for metering/policing of incoming packets restricts incoming traffic flows to a certain rate. - The switches support up to six policers per Fast Ethernet port, and 60 policers on a Gigabit Ethernet port. - The switches offer granularity of traffic flows at 1 Mbps on Fast Ethernet ports, and 8 Mbps on Gigabit Ethernet ports.
QoS marking at ingress	- The switches support marking and remarking packets based on the state of policers/meters. - The switches support marking and remarking based on the following mappings: from DSCP to 802.1p, and from 802.1p to DSCP. - The switches support 14 well-known and widely used DSCP values. - The switches support classifying or reclassifying packets based on the default DSCP per port, and support classification based on DSCP values in the ACL. - The switches support classifying or reclassifying frames based on the default 802.1p value per port. - The switches support 802.1p override at ingress.
QoS scheduling support at egress	- Four queues per egress port are supported in hardware. - The WRR queuing algorithm helps ensure that low-priority queues are not starved. - Strict Priority Scheduling helps ensure that time-sensitive applications such as voice always follow an expedited path through the switch fabric.
Sophisticated traffic management	- The switch offers the ability to limit data flows based on MAC source or destination address, IP source or destination address, TCP/UDP port numbers, or any combination of these fields. - The switch offers the ability to manage data flows asynchronously upstream and downstream from the end station or on the uplink.
Management	

Feature	Benefit
Superior manageability	• An embedded Remote Monitoring (RMON) software agent supports four RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis. • The switch supports all nine RMON groups through the use of a Cisco SwitchProbe[®] Analyzer Switched Port Analyzer (SPAN) port, permitting traffic monitoring of a single port, a group of ports, or the entire switch from a single network analyzer or RMON probe. • A SPAN port monitors traffic of a single port from a single network analyzer or RMON probe. • Remote SPAN (RSPAN) allows network administrators to locally monitor ports in a Layer 2 switch network from any other switch in the same network. • DHCP Snooping Option 82 enables more sophisticated IP address assignment by the DHCP server. • The Domain Name System (DNS) provides IP address resolution with user-defined device names. • Trivial File Transfer Protocol (TFTP) reduces the cost of administering software upgrades by downloading from a centralized location. • Network Timing Protocol (NTP) provides an accurate and consistent timestamp to all switches within the intranet. • Layer 2 traceroute eases troubleshooting by identifying the physical path that a packet takes from the source device to a destination device. • Crash Information Support enables the switch to generate a crash file for improved troubleshooting. • Show Interface Capabilities provides information on the configuration capabilities of any interface. • RTTMON-MIB allows users to monitor network performance between a Cisco Catalyst switch and a remote device.
Cisco Network Assistant software	• Cisco Network Assistant software is free, standalone network management application software that simplifies the administration of networks of up to 250 users. It supports a wide range of Cisco Catalyst intelligent switches from Cisco Catalyst 2940 through Cisco Catalyst 4506. With Cisco Network Assistant, users can manage Cisco Catalyst switches plus launch the device managers of Cisco integrated services routers (ISRs) and Cisco Aironet[®] WLAN access points by simply clicking their icon in the topology map. • Cisco AVVID wizards use just a few user inputs to automatically configure the switch to optimally handle different types of traffic: voice, video, multicast, and/or high-priority data. • A security wizard is provided to restrict unauthorized access to servers and networks and to restrict certain applications on the network. • One-click software upgrades can be performed across multiple switches simultaneously, and configuration cloning enables rapid deployment of networks. • Cisco Network Assistant software supports multilayer feature configurations such as ACPs and QoS parameters. • Cisco Network Assistant Software Guide Mode assists users in the configuration of powerful advanced features by providing step-by-step instructions. • Cisco Network Assistant software provides enhanced online help for context-sensitive assistance. • Easy-to-use GUI provides both a topology map and front-panel view of the switches. • Multidevice and multiport configuration capabilities allow network administrators to save time by configuring features across multiple switches and ports simultaneously. • User-personalized interface allows users to modify polling intervals, table views, and other settings within Cisco Network Assistant software and to retain these settings the next time they use Cisco Network Assistant. • Alarm notification provides automated e-mail notification of network errors and alarm thresholds.
Support for CiscoWorks	• Manageable through CiscoWorks network management software on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs. • SNMPv1, v2, and v3 (non-crypto) and Telnet interface support deliver comprehensive in-band management, and a CLI-based management console provides detailed out-of-band management. • Cisco Discovery Protocol versions 1 and 2 enable a CiscoWorks network management station to automatically discover the switch in a network topology. • CiscoWorks is supported by the CiscoWorks 2000 LAN Management Solution.

Feature	Benefit
Ease of use and ease of deployment	• Cisco Device Manager is embedded Web-based software that allows the customer to easily configure and troubleshoot the switch, eliminating the need for more complex terminal emulation programs and CLI knowledge, and reducing the cost of deployment by enabling less-skilled personnel to quickly and simply set up switches. • Smartports offers a set of verified feature macros per connection type in an easy-to-apply manner. With these macros, users can consistently and reliably configure essential security, availability, quality of service, and manageability features recommended for Cisco Business-Ready Campus solutions with minimal effort and expertise. • Autoconfiguration eases the deployment of switches in the network by automatically configuring multiple switches across a network via a boot server. • Autosensing on each Ethernet port] detects the speed of the attached device and automatically configures the port for 10-, 100-, or 1000-Mbps operation, easing the deployment of the switch in mixed 10, 100, and 1000BASE-T environments. • Autonegotiating on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth. • Cisco VTP supports dynamic VLANs and dynamic trunk configuration across all switches. • DTP enables dynamic trunk configuration across all ports in the switch. • Voice VLAN simplifies telephony installations by keeping voice traffic on a separate VLAN for easier network administration and troubleshooting. • Dynamic Trunking Protocol (DTP) enables dynamic trunk configuration across all ports on the switch. • PAgP automates the creation of Cisco Fast EtherChannel or Gigabit EtherChannel groups, enabling linking to another switch, router, or server. • Link Aggregation Control Protocol (LACP) allows the creation of Ethernet channeling with devices that conform to IEEE 802.3ad. This is similar to Cisco EtherChannel and PAgP. • The default configuration stored in Flash helps ensure that the switch can be quickly connected to the network and can pass traffic with minimal user intervention.

Table 2. Product Specifications

Feature	Description
Performance	• 13.6 Gbps switching fabric • Cisco Catalyst 2955T-12: 6.4 Gbps maximum forwarding bandwidth • Cisco Catalyst 2955C-12: 2.8 Gbps maximum forwarding bandwidth • Cisco Catalyst 2955S-12: 2.8 Gbps maximum forwarding bandwidth • (Forwarding rates based on 64-byte packets) • Cisco Catalyst 2955T-12: 4.8 Mpps wire speed forwarding rate • Cisco Catalyst 2955C-12: 2.0 Mpps wire speed forwarding rate • Cisco Catalyst 2955S-12: 2.0 Mpps wire speed forwarding rate • 8 MB memory architecture shared by all ports • Up to 32 MB SDRAM and 16 MB Flash memory • Configurable up to 8000 MAC addresses
Management	• BRIDGE-MIB • CISCO-ACCESS-ENVMON-MIB • CISCO-BULK-FILE-MIB • CISCO-C2900-MIB • CISCO-CDP-MIB • CISCO-CLUSTER-MIB • CISCO-CONFIG-MAN-MIB • CISCO-ENTITY-ALARM-MIB • CISCO-ENTITY-MIB • CISCO-ENVMON-MIB • CISCO-FLASH-MIB • CISCO-FTP-CLIENT-MIB • CISCO-HSRP-MIB • CISCO-IGMP-FILTER-MIB • CISCO-IMAGE-MIB • CISCO-LAG-MIB • CISCO-MAC-NOTIFICATION-MIB • CISCO-MEMORY-POOL-MIB • CISCO-PAE-MIB • CISCO-PAGP-MIB • CISCO-PORT-SECURITY-MIB • CISCO-PRIVATE-VLAN-MIB • CISCO-PROCESS-MIB • CISCO-PRODUCTS-MIB • CISCO-RTTMON-MIB • CISCO-STACKMAKER-MIB • CISCO-STP-EXTENSIONS-MIB • CISCO-SYSLOG-MIB • CISCO-TCP-MIB • CISCO-VLAN-MEMBERSHIP-MIB • CISCO-VTP-MIB • ENTITY-MIB • ETHERLIKE-MIB • HC-RMON-MIB • IEEE8021-PAE-MIB • IEEE8023-LAG-MIB • IF-MIB • IP-MIB • OLD-CISCO-CPU-MIB • OLD-CISCO-FLASH-MIB • OLD-CISCO-INTERFACES-MIB • OLD-CISCO-IP-MIB • OLD-CISCO-MEMORY-MIB • OLD-CISCO-SYSTEM-MIB

Feature	Description
	• OLD-CISCO-TS-MIB • RFC1213-MIB • RFC1398-MIB • RMON-MIB • RMON2-MIB • SMON-MIB • SNMP-FRAMEWORK-MIB • SNMP-MPD-MIB • SNMP-TARGET-MIB • SNMPv2-MIB • TCP-MIB • UDP-MIB
Standards	• IEEE 802.1x support • IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) • IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) • IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports • IEEE 802.1D Spanning-Tree Protocol • IEEE 802.1p CoS prioritization • IEEE 802.1Q VLAN • IEEE 802.3 10BASE-T specification • IEEE 802.3u 100BASE-TX specification • IEEE 802.3ab 1000BASE-T specification • IEEE 802.3ad Link Aggregation Control Protocol (LACP) • IEEE 802.3ah Ethernet in the First Mile (EFM) • RMON I and II standards • SNMPv1, SNMPv2c, and SNMPv3
Connectors and cabling	• 10BASE-T/100BASE-TX ports: RJ-45 connectors; four-pair Category 5 UTP cabling • 1000BASE-T ports: RJ-45 connectors; four-pair Category 5 UTP cabling • 100BASE-FX ports: MT-RJ connectors; 50/125 or 62.5/125 micron multimode fiber-optic cabling • 100BASE-LX ports: LC connectors; 9/125 micron single-mode fiber-optic cabling • Management console port: 8-pin RJ-45 connector, RJ-45-to-RJ-45 rollover cable with RJ-45-to-DB9 adapter for PC connections; for terminal connections, use RJ-45-to-DB25 female data-terminal-equipment (DTE) adapter (can be ordered separately from Cisco, part number ACS-DSBUASYN=)
MT-RJ patch cables for Cisco Catalyst 2955	Type of cable, Cisco part number • One-meter, MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-1M • Three-meter, MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-3M • Five-meter, MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-5M • One-meter, MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-1M • Three-meter, MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-3M • Five-meter, MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-5M • Two-meter, LC to SC single-mode cable, CAB-CP-LCSC-2M
Indicators	• Per-port status LEDs: Link integrity, disabled, activity, and indications • Dual-power-supply indicators • Major and minor alarm-relay indicators
Dimensions and weight (HxWxD)	• 3.78x8.07x5.03 in. (9.60x20.50x12.78 cm): Connectors facing forward • 5.03x8.07x3.78 in. (12.78x20.50x9.60 cm): Connectors facing downward • 3.0 lb (1.4 kg)
Relay contacts	• Surge withstand between open contacts: 1500V, FCC Part 68 • Surge withstand between contact and coil: 2500V, Bellcore • Maximum switching capacity: 1A @ 30 VDC • Maximum switching voltage: .3A @ 125 VAC

Feature	Description
Environmental ranges	- Recommended operating temperature range: -40° to 140 °F (-40° to 60°C) - Recommended storage temperature range: -40° to 185°F (-40° to 85°C) - Operating relative humidity: 10 to 95% (noncondensing) - Operating altitude: 9843 ft (3000 m) @ 104°F (40° C) - Storage altitude: Up to 29,500 ft (9000 m) - Shock: 50 g trapezoidal shock (meets or exceeds ASTM D3332) - Vibration: 500 Hz (meets or exceeds MIL-STD-810, Method 514.5)
Power requirements	- External 24V (dual-redundant DC input, screw-down connectors) - Power consumption: 23W maximum, 78.53 BTU/hour 18V minimum; 32V maximum
Predicted mean time between failure (MTBF)	- WS-C2955T 235,022 hours - WS-C2955C 206,378 hours - WS-C2955S 205,115 hours - Telcordia SR-332 Gf
Fiber port specifications	100BASE-FX (MT-RJ connectors @ 1,300 nm): - Optical receiver sensitivity: -30 dBm - Optical transmitter power: -19 to -14 dBm - Maximum distance: 2 km 100BASE-LX (LC connectors @ 1,300 nm): - Optical receiver sensitivity: -38 to -31 dBm - Optical transmitter power: -15 to -8 dBm - Maximum distance: 15 km
Regulatory Agency Approvals	
Safety certifications Hazardous locations	- CE Marking - UL 60950 - CSA 22.2/60950 - TUV GS: CB Report to IEC 60950 - UL 508 - CSA 22.2/142 - AS/NZS 3260 - NOM - UL 1604—Class I, Div 2 Group A, B, C, D - CSA 22.2/213—Class 1, Div 2 Group A, B, C, D - EN 50021—Class I, Zone 2
Electromagnetic emissions certifications	- FCC Part 15 Class A - ICES-003 Class A - EN 55022: (CISPR22 Class A) - EN 55024: (CISPR24) - VCCI Class A - AS/NZS CISPR 22 Class A - VCCI Class 1 - CE Marking - CNS 13438 - BSMI Class A - MIC Class A - EN 61131-2 - EN 55011 (CISPR 11) Class A
ITS	NEMA TS-2
Warranty	Limited five-year warranty
External DIN Rail Mountable Power Supply	
Input voltage	AC100-120/220-240V (switchable) 47-63 Hz
Input current	<1.3A (switch in 115V position)
Input current	<0.7A (switch in 230V position)
Output voltage	24 VDC (+5%, -1%)
Size (WxHxD)	1.92x4.92x4.05 (50x125x103 mm)

Feature	Description
Weight	1 lb (460 g)
Worldwide approvals	UL, EN, CSA, and CB
Overload protection	Over 1.5 times normal current
Cooling	Normal convection cooling
Temperature range	• -25° to +85°C (storage) • -10° to +60°C (operating)

Service and Support

The service and support programs described in Table 3 are available as part of the Cisco Desktop Switching Service and Support solution, and are available directly from Cisco and through resellers.

Table 3. Cisco Service and Support Programs

Service and Support	Features	Benefits
Advanced Services		
Total Implementation Solutions (TIS)—available direct from Cisco	• Project management • Site survey and configuration deployment	• Supplements existing staff • Helps ensure that functionality meets customer needs
Packaged Total Implementation Solutions (Packaged TIS)—available through resellers	• Installation, text, and cutover • Training • Major moves, adds, or changes • Design review and product staging	• Mitigates risk
Technical Support Services		
Cisco SMARTnet® and SMARTnet Onsite—available direct from Cisco	• 24x7 access to software updates • Web access to technical repositories	• Enables proactive or expedited issue resolution • Lowers cost of ownership by using Cisco expertise and knowledge
Packaged SMARTnet—available through resellers	• Telephone support through the Technical Assistance Center • Advance replacement of hardware parts	• Minimizes network downtime

Table 4. Ordering Information

Model Numbers	Configuration
WS-C2955T-12	Twelve 10/100 ports and two 10/100/1000BASE-T ports
WS-C2955C-12	Twelve 10/100 ports and two 100BASE-FX ports
WS-C2955S-12	Twelve 10/100 ports and two 100BASE-LX ports
PWR-2955-AC=	DIN Rail mountable 24V power supply (85 to 264 VAC, or 90 to 375VDC input)
STK-RACKMNT-2955=	DIN Rail Adapter for 19" rack mounting

For More Information on Cisco Products

- **United States and Canada:** 800 553-NETS (6387)
- **Europe:** 32 2 778 4242
- **Australia:** 612 9935 4107
- **Other:** 408 526-7209
- <http://www.cisco.com>



Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

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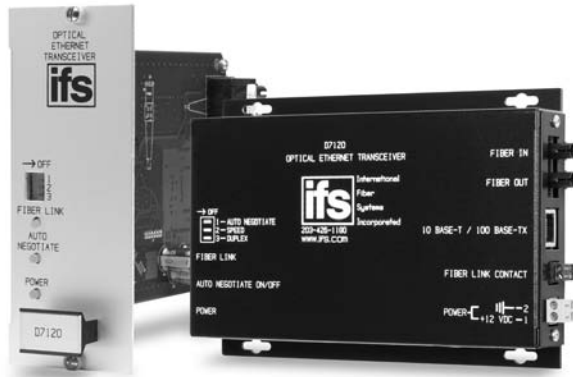
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PRODUCT SPECIFICATION

D7100 SERIES

10/100 Mbps ETHERNET OPTICAL TRANSCEIVER



DESCRIPTION

The IFS D7100 Series ethernet transceiver is designed to transmit and receive 10 or 100 Mbps data over multimode or singlemode fiber. The IFS D7100 Series will function as a 10 Mbps Ethernet link, or as a 100 Mbps Ethernet link without any adjustments. The D7100 Series is environmentally hardened to operate in extreme temperatures. Status indicating LED's for power and data type are present at the RJ-45 connector and at the fiber optic transceiver end. Plug-and-play design ensures ease of installation requiring no electrical or optical adjustments. The modules are available in either stand-alone or rack mount versions.

APPLICATION EXAMPLES

- 10/100 Mbps Ethernet
- High Speed Computer Links

FEATURES

- 10/100 Mbps Ethernet
 - Auto-Negotiating
 - 10/100 Selectable
 - Full Duplex or Half Duplex Data
- Auto Network Detection MDI/MDI-X
- Distances up to 45 km (28 miles)
- NTCIP Compatible
- Tested and Certified by an Independent Testing Laboratory for Full Compliance with the Environmental Requirements (Ambient Operating Temperature, Mechanical Shock, Vibration, Humidity with Condensation, High-Line/Low-Line Voltage Conditions and Transient Voltage Protection) of NEMA TS-1/TS-2 and the Caltrans Specification for Traffic Signal Control Equipment.

- Multimode and Singlemode Versions Available
- ST Optical Connectors Standard
- No In-field Electrical or Optical Adjustments Required
- Power, Transmit and Receive Data Status LED Indicators

- Hot-Swappable Rack Modules

Available at: **www.ifs.com**

- IEEE 802.3 Compliant

- Comprehensive Lifetime Warranty

- A & E Specifications, (CSI)
- AutoCAD Drawings
- Operation Manuals
- Technical Bulletins

ORDERING INFORMATION

	PART NUMBER	DESCRIPTION	FIBERS REQUIRED	OPTICAL PWR BUDGET	MAX. DISTANCE*
MULTIMODE 62.5/125µm**	D7120	10/100 Mbps Ethernet (1310 nm)	2	10 dB	1.2 miles (2 km)
	D7120WDMA❖	10/100 Mbps Ethernet (1310/1550 nm)	1	10 dB	3 miles (5 km)
	D7120WDMB	10/100 Mbps Ethernet (1550/1310 nm)			
SINGLEMODE 9/125µm	D7130WDMA❖	10/100 Mbps Ethernet (1310/1550 nm)	1	15 dB	28 miles (45 km)
	D7130WDMB	10/100 Mbps Ethernet (1550/1310 nm)			
ACCESSORIES❖	PS-12VDC 12 Volt DC Plug-in Power Supply (Included)				
	PS-12VDC-230 12 Volt DC Plug-in Power Supply, 230 VAC Input (Included if specified at time of order)				
OPTIONS	Add ‘-R3’ to Model Number for R3 Rack Mount (Requires R3 Rack purchased separately)				
	Add ‘-C’ for Conformally Coated Printed Circuit Boards (Extra charge, consult factory)				

* Optical transmission distance is limited to optical loss of the fiber and any additional loss introduced by connectors, splices and patch panels. Distance can also be limited by fiber bandwidth. **For 50/125 Fiber, subtract 4 dB from Optical Power Budget. ♦ WDMA must mate with a WDMB.

♦ All accessories are third party manufactured.



TECHNICAL SPECIFICATION

D7100 SERIES

10/100 Mbps ETHERNET OPTICAL TRANSCEIVER

SPECIFICATIONS

DATA

Data Interface:	Ethernet
Data Rate:	10/100 Mbps
	IEEE 802.3 Compliant
	Full Duplex or Half Duplex

WAVELENGTH

D7120	1310 nm, Multimode
D7120WDM	1310/1550 nm, Multimode
D7130WDM	1310/1550 nm, Singlemode

NUMBER OF FIBERS

1 or 2

CONNECTORS

Optical:	ST
Power:	Terminal Plug with screw clamps
Data:	RJ-45

ELECTRICAL & MECHANICAL

Power:	
Surface Mount:	12 VDC @200 mA
Rack:	From Rack
Number of Rack Slots:	2
Voltage Regulation:	Solid-state; independent on each board
Current Protection:	Automatic Resettable Solid-State Current Limiters
Circuit Board:	Meets IPC Standard
Size (in./ cm.) (LxWxH):	
Surface Mount:	7.0 x 4.9 x 1.0 in., 17.8 x 12.5 x 2.5 cm.
Rack Mount:	7.7 x 5.0 x 2.0 in., 19.6 x 12.7 x 5 cm
Shipping Weight:	< 2 lbs./0.9 kg

ENVIRONMENTAL

MTBF:	>100,000 hours
Operating Temp:	-40° C to +74° C
Storage Temp:	-40° C to +85° C
Relative Humidity:	0% to 95% (non-condensing)†

† May be extended to condensation conditions by adding suffix '-C' to model number for conformal coating.

AGENCY COMPLIANCE

FCC PART 15 COMPLIANT



MADE IN THE USA

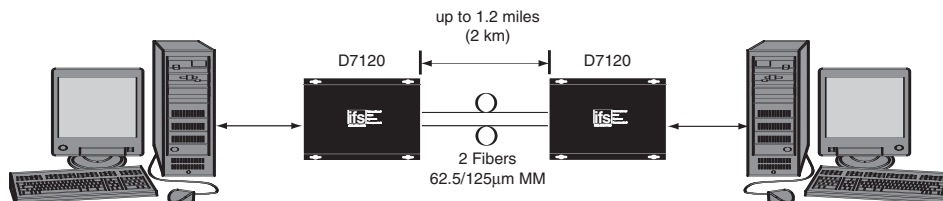
Complies with FDA Performance Standard for Laser Products, Title 21, Code of Federal Regulations, Subchapter J

OPTICAL POWER BUDGET

FIBER	WAVELENGTH	TRANSCEIVER MODEL	OPTICAL PWR BUDGET	MAX. DISTANCE*
Multimode 62.5/125µm**	1310 nm	D7120	10 dB	1.2 miles (2 km)
	1310/1550 nm	D7120WDM (1310/1550 nm) D7120WDMB (1550/1300 nm)	10 dB	3 miles (5 km)
Singlemode 9/125µm	1310/1550 nm	D7130WDM (1310/1550 nm) D7130WDMB (1550/1310 nm)	15 dB	28 miles (45 km)

* Optical transmission distance is limited to optical loss of the fiber and any additional loss introduced by connectors, splices and patch panels. Distance can also be limited by fiber bandwidth. **For 50/125 Fiber, subtract 4 dB from Optical Power Budget.

SYSTEM DESIGN



TEL (203)426-1180 ■ FAX (203)426-3326 ■ www.ifs.com ■ sales@ifs.com
16 Commerce Road ■ Newtown, CT 06470

Due to our continued effort to advance technology, product specifications are subject to change without notice.

09/19/07

**High-Performance Switching:**

- + 5.6Gbps Switching Capacity
- + 8 Ports IEEE 802.3af PoE
- + 802.1s (Multiple Spanning Tree)
- + 802.3w (Rapid Spanning Tree)
- + Bandwidth Control down to 64k
- + 1 x 1000Base-T Port
- + 1 x SFP Slot
- + Small Footprint - 11" Chassis
- + Rackmountable

Network Management:

- + SSH/SSL
- + SNMP v1/2c/3
- + RMON (4 Groups)
- + Web GUI/CLI
- + Console
- + TACACS+ Authentication
- + RADIUS Client

PoE Power Management:

- + Port Status Monitoring
- + Fast Power Shutdown
- + GUI Power Status Monitoring
- + Auto PD Detection
- + PoE Status Counters & Alerts

Enterprise Features:

- + 802.1p Priority/QoS (4 Queues)
- + Priority-based on DSCP
- + 802.1x (Port & MAC Based Authentication)
- + VLANs (Up to 256)
- + Guest VLAN
- + Private VLANs
- + Internal Power Supply
- + Redundant Power Supply (Optional)

8-Port 10/100Mbps PoE Switch, 1 x 1000BASE-T Port & 1 SFP

With a 5.6Gbps switching capacity and Power-over-Ethernet (PoE) support, the DES-3010PA by D-Link® is a high-performance, managed Layer 2 solution that provides an ideal choice for workgroups and departments needing advanced Layer 2 switching features in a small form factor, 11" chassis. The DES-3010PA is a great entry-level switch for the SMB just starting out or the already established business looking to bring a managed solution to the desktop. The optional fiber uplink can provide connectivity for a small group of users over a larger distance such as on an educational or business campus. The DES-3010PA has eight 10/100Mbps ports and an SFP port for high-speed uplinks to servers and/or backbones. The DES-3010PA is also equipped with a copper 1000Base-T port for easy uplinks to standard Gigabit copper switches. With support for Power-over-Ethernet on all eight ports, the DES-3010PA supports 802.3af-enabled access points, security cameras, IP phones and more without requiring additional wiring.

High-Performance Layer 2 Switching

With a 5.6Gbps switching capacity, the DES-3010PA is a wire-speed, high performance switch. It includes support for Private VLANs (which protect privacy by isolating ports) and Guest VLANs. Guest VLANs are useful when migrating end users to an 802.1x environment when existing workstations do not yet support the 802.1x protocol, and for delivering limited services such as Internet access to un-authenticated or short-term users. When deployed in a school campus, bookstore, coffee house, or other retail establishment, the DES-3010PA can be used in conjunction with wireless access points to create a secure Internet Hot Spot. This allows visitors to access special services or surf the Internet completely isolated from sensitive internal network data. And with the addition of up to 15.4 watts of PoE per port, powering those wireless access points has never been easier.

Advanced Enterprise Features

The DES-3010PA brings advanced enterprise functions to a more affordable level while supporting QoS/CoS (based on 802.1p, Port, DSCP and ToS), rich security and management features such as 802.1x port and MAC based RADIUS and TACACS+ authentication, secure encrypted management through both SSH and SSL, Guest and Private

VLANs, Bandwidth Control, and SNMP versions 1/2c/3. The DES-3010PA also supports many of the features you would expect to see on a larger managed solution such as IGMP snooping, 802.3ad (Link Aggregation), 256 VLANs, support for GVRP, traffic monitoring, SYSLOG, and more.

IEEE 802.3af Power over Ethernet

The DES-3010PA provides eight 802.3af (PoE) ports and supplies up to 15.4 watts per port for any 802.3af-compliant device. The popularity of PoE-enabled switching devices grows as more PoE-capable access points, IP phones, security cameras, and PDA cradles hit the market. The difficulty and cost often associated with running new AC power outlets to hard-to-reach locations has made PoE an indispensable technology for SMBs, schools, and Enterprise-class networks. D-Link can even supply power and add PoE operability to non-PoE products with the DWL-P50 adapter.

Advanced Power Management

The DES-3010PA includes advanced PoE power management capabilities not found in unmanaged PoE solutions. These features include individual port status monitoring, fast power shutdown (in the case of power supply failure) and voltage/current monitoring and regulation. Power management determines the exact power draw per port and balances each port's PoE power output accordingly. This allows the switch to power higher and lower wattage devices according to user-definable parameters such as maximum available power, port priority (critical, high, low), and maximum allowable power per port. The DES-3010PA provides the following power status and troubleshooting statistics from an easy-to-read CLI and GUI anywhere in the network: Powered Device (PD) classification, PD status, power status monitoring (displaying power usage and percent utilized), along with short and overload notification.



8-Port 10/100Mbps PoE Switch, 1 x 1000BASE-T Port & 1 SFP

Technical Specifications

Product Specifications

DES-3010PA	Managed 8-Port 10/100 PoE Switch with 1 1000BASE-T Port, 1 SFP Port
Switch Fabric	5.6Gbps
Transmission Method	Store-and-Forward
VLANs	Support up to 256 VLAN Groups
Priority Queues	4 Queues
Packet Buffer	128KB
Multicast Support	IGMP Snooping

Interface Options

RJ-45	10BASE-T, 100BASE-TX & 1000BASE-T
SFP/mini-GBICs	1000BASE-X support based on Type of SFP, LC

Network Management

In & Out of Band	Telnet, CLI/Console, RMON, Web-based HTTP, SNMPv1/2/3, Port Mirroring, SSH 2.0, SSL
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Network Protocols and Standards

IEEE	802.3 Ethernet, 802.3u Fast Ethernet, 802.1D Spanning Tree, 802.1w Rapid Spanning Tree, 802.1s Multiple Spanning Tree, 802.1p Priority Tags (4 queues), 802.3ad Link Aggregation Control (six 8-port groups), 802.3x Flow Control, 802.1x (Port & MAC Based Network Access Control), 802.1Q VLANs (up to 256), Private VLANs, Guest VLANs, 802.3af Power-over-Ethernet
IETF	RFC1757 RMON (4 Groups), RFC1493 Bridge, RFC1643 Ether-like MIB, RFC2358 ETHER LIKE_MIB, RFC2674
Additional Features	IGMP Snooping, Telnet, TFTP Client, BootP Client, DHCP Client, SNMP v1/2c/3, Rate Limiting down to 64k, QoS classification based on ToS, Traffic Monitoring, MAC address browsing, Port Description, CPU Utilization Monitoring, STMP, Radius Authentication, TACACS+ Authentication, Auto-Negotiation, Port Mirroring, Broadcast Storm Control, SYSLOG, GVRP

Electrical & Emissions Summary

Emissions	FCC Class A, CE, VCCI
Power Supply	AC Input: 100 - 240 VAC, 50-60 Hz
PoE Power per Port	15.4 Watts Maximum
PoE Power Budget	110 Watts
Power Consumption	130 Watts Maximum
Heat Dissipation	444 BTU/hr Maximum

Safety Agency Certifications and Environmental

Safety	CuL
Temperature	Operating: 32 ~ 122°F (0 ~ 50°C) Storage: 14 ~ 158°F (-10 ~ 70°C)
Humidity	Operating: 10%-90% RH Storage: 5% ~ 90% RH



8-Port 10/100Mbps PoE Switch, 1 x 1000BASE-T Port & 1 SFP

Physical Specifications

Dimensions (Dx W x H)	7.1in x 11in x 1.7in (180.1mm x 279.4mm x 43.9mm)
Weight	4 lbs (1.8 kg)

Warranty Information

Warranty	Limited Lifetime ¹
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Ordering Information

<u>Part Number</u>	Description
DES-3010PA	Managed 8-Port 10/100 PoE Switch with 1 1000BASE-T Port, 1 SFP Port
DES-3010PA-TAA	TAA compliant version of DES-3010PA
DEM-310GT	1000BASE-LX SFP/mini-GBIC Up to 10Km (singlemode)
DEM-311GT	1000BASE-SX SFP/mini-GBIC Up to 550m
DPS-510	Redundant Power Supply

¹ Available only in the U.S.A. and Canada

All references to speed are for comparison purposes only. Product specifications, size and shape are subject to change without notice, and actual product appearance may differ from that depicted herein. Specifications contained herein are based on Hardware version A1/A2/A3.

AXIS 243Q Blade Video Server / AXIS 291 1U Video Server Rack

Full frame rate, high-density video encoder rack solution.



- > Full frame rate
- > High-density solution
- > High-quality, de-interlaced video
- > Simultaneous MPEG-4 and Motion JPEG
- > Video motion detection and pre-/post-alarm buffer
- > Support for PTZ and dome cameras

AXIS 291 1U Video Server Rack is a high-density solution for seamless and professional installation of video encoders. Together with the AXIS 243Q Blade Video Server, it is designed to migrate analog systems to high performance, IP-based, digital solutions.

The powerful combination of AXIS 243Q and AXIS 291 1U offers full frame rate at up to 4CIF resolutions on all channels simultaneously.

Analog video is converted to high-quality, de-interlaced, digital video.

Simultaneous Motion JPEG and MPEG-4 for optimized quality and bandwidth.

The event management capabilities ensure efficient use of the cameras in the network video system. This includes video motion detection, active tampering alarm, and alarm buffering.

The video server enables pan/tilt/zoom control over the network of all leading brands of analog video cameras on the market.



Technical specifications – AXIS 243Q Blade Video Server / 291 1U Video Server Rack

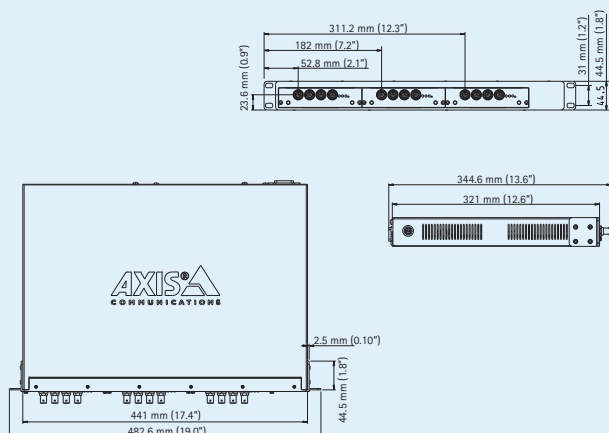
Video server	
Models	AXIS 243Q Blade Video Server Requires the AXIS 201 1U Video Server Rack or the AXIS Q7900 Rack
Video compression	MPEG-4 Part 2 (ISO/IEC 14496-2) Motion JPEG
Resolutions	704x576 to 160x120
Frame rate MPEG-4	Up to 30/25 (NTSC/PAL) per channel in all resolutions
Frame rate Motion JPEG	Up to 30/25 (NTSC/PAL) per channel in all resolutions
Video streaming	Simultaneous MPEG-4 and Motion JPEG Controllable frame rate and bandwidth VBR/CBR MPEG-4
Image settings	Compression, color Rotation: 90°, 180°, 270° Aspect ratio correction Text and image overlay Privacy mask Deinterlace filter
Network	
Security	Password protection, IP address filtering, HTTPS encryption, IEEE 802.1X network access control
Supported protocols	IPv4/v6, HTTP, HTTPS, QoS layer 3 DiffServ, FTP, SMTP, Bonjour, UPnP, SNMPv1/v2c/v3(MIB-II), DNS, DynDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS
System integration	
Application Programming Interface	Open API for software integration, including VAPIX® from Axis Communications available at www.axis.com
Intelligent video	Video motion detection, active tampering alarm
Alarm triggers	Intelligent video, external inputs, video loss, on boot, PTZ preset
Alarm events	File upload via FTP, HTTP and email Notification via email, HTTP and TCP External output activation
Video buffer	9 MB pre- and post-alarm per channel
Pan/Tilt/Zoom	Wide range of analog PTZ cameras supported (drivers available for download at www.axis.com) 20 presets/camera, guard tour, PTZ control queue Supports Windows compatible joysticks

General	
Processor and memory	4x ETRAX 100LX, 4x ARTPEC-2, 4x 32 MB RAM, 4x 8 MB Flash
Power	Powered from AXIS 291 1U Video Server Rack
Connectors	4 analog composite video BNC input, NTSC/PAL auto-sensing RJ-45 10BASE-T/100BASE-TX Terminal block for 4 inputs, 4 outputs and RS-485 half duplex
Operating conditions	0 – 45 °C 32 – 113 °F Humidity 20 – 80% RH (non-condensing)
Approvals	EN 61000-6-1, EN 61000-6-2, EN 55024, EN 55022 Class B, EN 61000-3-2, EN 61000-3-3, FCC Part 15 Subpart B Class B, AS/NZS CISPR 22, ICES-003, VCCI Class B, ITE EN 60950-1
Weight	270 g (0.6 lbs)
Included accessories	Installation Guide, CD with installation and management tools, software and User's Manual, 1 Windows decoder user license

291 1U Video Server Rack	
Expansion slots	3 slots for Axis blade video servers
Casing	Metal casing for standalone or rack mounting
Power	100 – 240 V AC, 1.9 A max 80 W (with 3x243Q)
Connectors	Ethernet 10BASE-T/100BASE-TX/1000BASE-T, RJ-45 (Gigabit Ethernet) 3 terminal blocks: 4 alarm inputs 4 outputs RS-485/422 half-duplex
Operating conditions	0 – 45 °C (32 – 113 °F) Humidity 20 – 80% RH (non-condensing)
Approvals	EN 55022 Class B, EN 61000-3-2, EN 61000-3-3, EN 55024, EN 61000-6-1, EN 61000-6-2, FCC Part 15 Subpart B Class B, VCCI Class B, AS/NZ CISPR 22, ICES-003, ITE, UL, cUL, EN 60950-1, CB-certificate, KTL
Weight	3.7 kg (8.2 lbs) excluding blades
Included accessories	Installation Guide, mounting kit, AC power cable

More information is available at www.axis.com

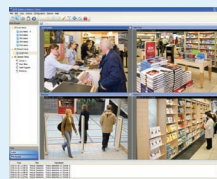
Dimensions



Optional accessories



AXIS 295
Video Surveillance Joystick



For information on AXIS Camera Station and video management software from Axis' Application Development Partners, see www.axis.com/products/video/software/